THE JOURNAL OF

MEDICAL EDUCATION

OFFICIAL PUBLICATION OF
THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

DECEMBER, 1956 • VOLUME 31 • NUMBER 12
In Two Parts—Part I

SPECIAL ISSUE

CARDIOVASCULAR TEACHING AS CONSIDERED BY THE VARIOUS DISCIPLINES

ALSO: Report of the 67th Annual Meeting

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VOL. 31 DECEMBER 1956 No. 12

Cardiovascular Teaching as Considered by the Various Disciplines

The Journal of
MEDICAL EDUCATION

Official publication of the Association of American Medical Colleges, 2530 Ridge Ave., Evanston, Ill.

The Journal of MEDICAL EDUCATION is owned and published monthly by the Association of American Medical Colleges, 2530 Ridge Avenue, Evanston, Illinois; Phone DAvis 8-9505. Entered as second class matter January 17, 1930, at the Post Office, Chicago, Ill., under the Act of March 3, 1879.

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SUBSCRIPTION RATES: $7 per year, $1 per single copy; foreign $8 per year; $1.25 per single copy. Change of Address: Notifications of changes of address should include the old address wrapper and the new address.

COPY DEADLINE: Copy for typesetting must be in by the 1st and plates by the 10th of the month preceding publication.

ADVERTISING: Journal of Medical Education, 2530 Ridge Avenue, Evanston, Illinois; Phone DAvis 8-9505.

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Oliver Wendell Holmes (1809-1894)

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Radiological Society of North America—Dec. 2-7, Palmer House, Chicago, Ill.

Association for Research in Nervous and Mental Diseases—Dec. 7-8, Hotel Roosevelt, New York, N. Y.

American Academy of Dermatology and Syphilology—Dec. 8-13, Palmer House, Chicago, Ill.

Congress of International Union Against Tuberculosis—Jan. 7-11, 1957, New Delhi, India.

Sixth International Congress of Otolaryngology—May 5-10, Washington, D. C.

International Vocie Conference—May 20-27, 1957, Chicago, Illinois.

Annual Meeting of the National Tuberculosis Association and the American Trudeau Society—May 5-11, 1957, Kansas City, Mo.

International Congress on Medicine and Surgery—June 1-9, 1957, Turin, Italy.

International Congress of Neurological Sciences—July 21-28, 1957, Brussells, Belgium.

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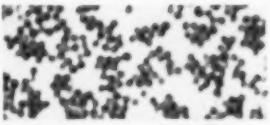

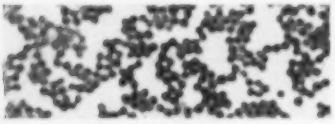

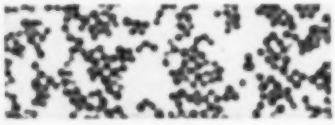

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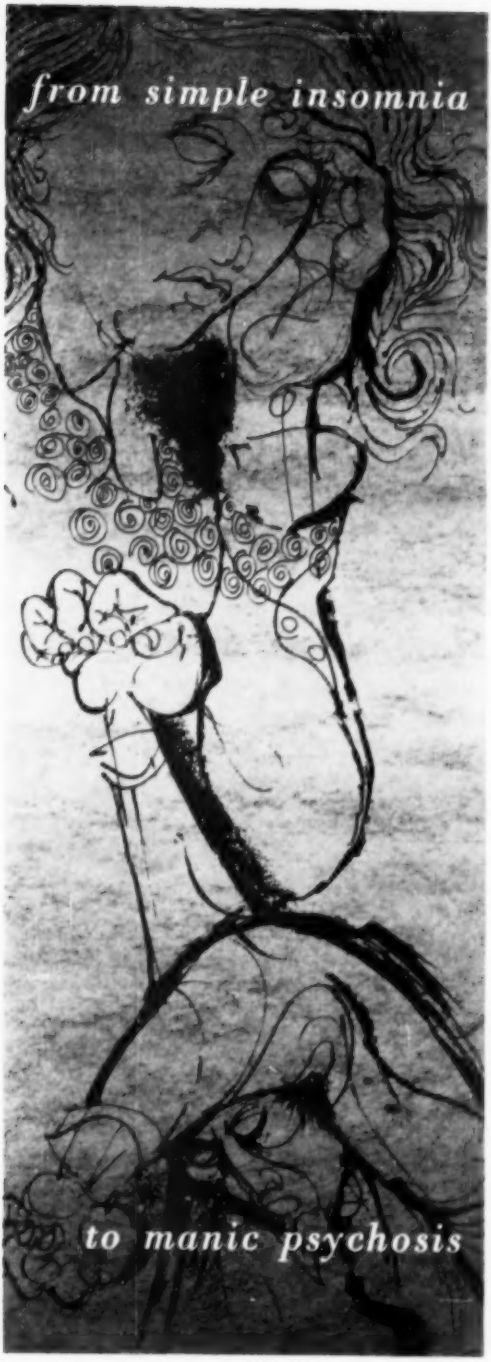

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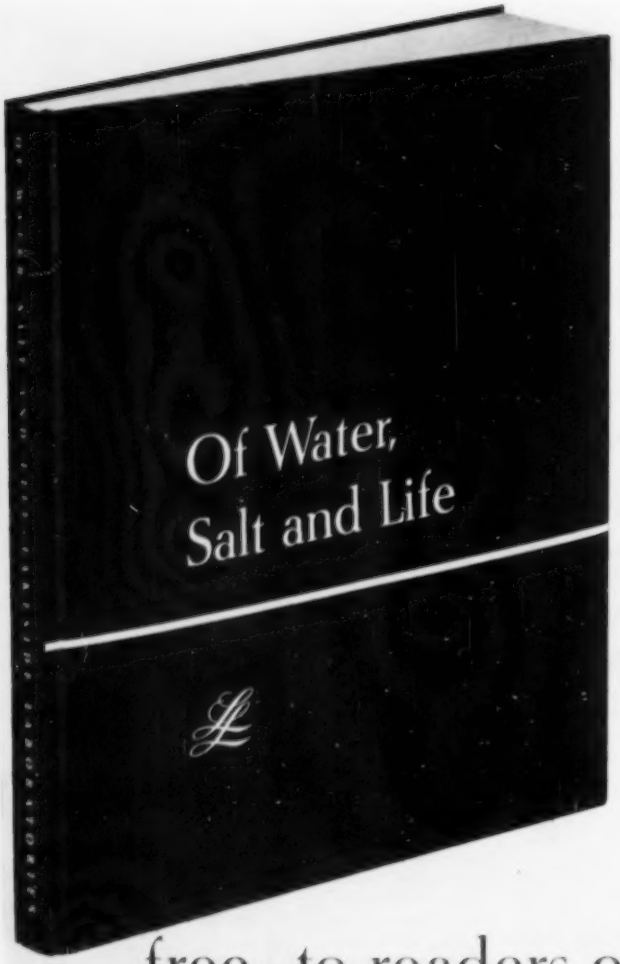

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Cardiovascular Teaching as Considered by the Various Disciplines

STEWART WOLF · ERIC OGDEN · J. FRANKLIN YEAGER
Guest Editors

Preface

THIS SPECIAL ISSUE contains contributions prepared by participants in a conference of program directors of the cardiovascular teaching grants of the National Heart Institute. The conference, held at Madison, Wis. on June 5-6, 1955, was the second meeting of the program directors and was designed to provide for an exchange of ideas and information—not to promote prescription or proscription of any teaching methods or emphases.

The first meeting had been held at Ithaca on June 2-3, 1954. Program directors or their representatives from 79 schools of medicine and from six schools of osteopathy attended. In addition half a dozen deans and medical educators were included as special guests. The chairman of this meeting and of the steering committee which had organized it was Dr. George Burch. At the first session he introduced Dr. James Watt, director of the National Heart Institute, and Dr. Franklin Yeager, chief of the Grants and Training Branch. Dr. Watt and Dr. Yeager explained that the grant program had come about as a means of strengthening the facilities of medical schools throughout the nation. They emphasized that, although the primary focus was on the teaching of the circulation and its disorders, interpretations were broad and there was no desire to overbalance or to circumscribe teaching in the schools. They reminded the program directors that the conference had been set up at their request and that the institute had no desire to prescribe or to criticize the way in which any school saw fit to

spend its grant toward the general objective of strengthening the cardiovascular program. The participants proceeded, in small groups and in general sessions, to exchange views and experiences relating to teaching methods, interdepartmental relations and the use of audiovisual aids. Since many aspects of the broad problem were left untouched, it was decided to continue to meet periodically as a group taking as a theme for each meeting a special aspect of cardiovascular teaching. The job of selecting a topic and making arrangements for special guests was left to a steering committee whose members were to be elected for a limited term of years. The members of the steering committee who planned the Madison meeting were as follows:

Dr. Stewart Wolf, chairman
Dr. Elliot Newman
Dr. Eric Ogden
Dr. Herrman L. Blumgart
Dr. Albert A. Kattus, Jr.
Dr. Helge E. Ederstrom

Dr. Charles W. Crumpton acted as local host for the group.

The Madison meeting was organized around a discussion of the participation of the various departments of a medical school in cardiovascular teaching. The discussions were touched off by brief presentations by the following guest speakers who discussed the problem of cardiovascular teaching from the point of view of the following disciplines:

Ernest Lachman, anatomy
Charles T. Dotter, radiology
Frank Glenn, surgery
Wendell H. Griffith, biochemistry
Alan C. Burton, biophysics
J. F. A. McManus, pathology
A. Clifford Barger, physiology
F. E. Shideman, pharmacology
Morton F. Reiser, psychiatry
Robert A. Good, pediatrics

The short manuscripts which some of the participants in this meeting were stimulated to write have been gathered together as a permanent record of current pedagogic opinion and emphasis.

Introduction

EDUCATIONAL METHOD in medical schools in the United States became pretty well crystallized over half a century ago. It has recently plunged into solution again and, under manipulation by medical faculties bent on self-examination, it is undergoing fermentation, polymerization and other changes which threaten the durability of interdepartmental boundaries. In the reevaluation of curriculum and teaching organization there has appeared an almost feverish concern with "broadening," "comprehensiveness" and "integration."

Before considering a new step in medical education it is fitting to review the important steps in the past which have brought us to our present position, and to assess the need, if any, for change. Prior to 100 years ago a large body of fairly exact data concerning the structure of man's body in its dead state had accumulated together with certain empiricisms useful in dealing with the symptoms of the sick. Students were taught in didactic lectures and they had scarcely any clinical experience during their school years.

Over the past 100 years, however,

changes have taken place based on a painstaking collection of data pertaining to the function of various living organs and organ systems in small animals and in man. These newer developments ultimately led to the establishment of bedside teaching with increasing emphasis on laboratory procedures for diagnosis. The limited command which clinical teachers had of the rapidly growing knowledge of many of the sciences basic to medicine necessitated the existence of separate "preclinical" departments for the teaching of medical students. Each one, charged with a part of the responsibility for educating the student, became a semiautonomous organization with jurisdiction over a certain number of hours in the student's day. The head of one department could set up his own curriculum independently of other departments.

Instead of further separating our categories of knowledge, however, the march of science has brought about a great deal of overlapping and, although at present at most schools a medical student learns the structure and function of the heart from two separate professors, it is not because of any real intellectual divergence among the members of various departments. Nowadays the biological horizon of "preclinical" teachers is broad. The interests of anatomists, as reflected by their publications, lie more with function than structure and hence are chiefly physiological. Pharmacologists are spending less time testing the action of chemical agents on isolated tissues. The tests for pharmacologic action and toxicity are being left largely to the drug houses, while the medical school departments of pharmacology are publishing papers about tissue metabolism. So are the biochemists.

Recent developments have also made the "great divide" between preclinical and clinical teaching less and less meaningful. Judging again by publications and also by observing teaching in the departments, it is clear that in many schools physiologists are not limiting themselves to the study of animal preparations but are also observing experiments of nature in the human preparation. By the same token clinicians are becoming more "physiologically minded." They are less concerned with syndromes and more and more with mechanisms. Gynecologists 50 years ago published chiefly concerning new operative techniques and maneuvers. They are now studying cytology, endocrinology and metabolism.

The teaching of cardiovascular disciplines has not escaped the storm of reappraisal. The blood vascular system with its responsibility for nourishing the cells of the body penetrates virtually every organ. In a sense, it provides intercommunication and integration among organs. It is therefore not surprising that it has been selected as a prototype for those who wish to integrate medical teaching in general.

At the meeting in Madison there were those who emphasized the greater ease with which information can be absorbed if presented in a carefully planned logical sequence by the various departments concerned. Others stressed the value of the virtuoso, the inspiring teacher independent of a design dictated by a committee consensus. Most participants agreed that no curriculum, however well planned, could of itself stimulate the student to scholarly inquiry.

If there was a consensus in the discussion at Madison, it was that much learning is not necessarily equivalent to much teaching and that tools and systems are subordinate in impor-

tance to the men—the teacher + the student. STEWART WOLF, M.D., *Department of Medicine, University of Oklahoma; Chairman of Steering Committee, Cardiovascular Program Directors, 1955.*

Introducción

Este número especial contiene artículos de los participantes en el Congreso (celebrado en Madison, Wisconsin, en Junio de 1955) de Directores de Programas de Enseñanza, en el campo de la Medicina cardiovascular, programas subvencionados por el *National Heart Institute*. La enseñanza de las disciplinas cardiovasculares, lo mismo que la de las otras disciplinas médicas, ha sufrido en las últimas décadas cambios importantes debidos, por un lado, al avance general de la ciencia, y, por otro, a la creciente tendencia hacia la integración, en la Educación Médica, de los diferentes Departamentos de Medicina. Dado el papel peculiar que el sistema vascular desempeña dentro del organismo humano, la enseñanza en este campo es considerada un prototipo por los partidarios de la integración de la Educación Médica en general.

The Teaching of Cardiovascular Physiology in the First Year

A. CLIFFORD BARGER

BY THE CHOICE of his profession the medical student has already expressed his preference for the study of human beings and their illnesses. Therefore, it would seem to be both sound and stimulating to introduce the future physician to the complexities of the cardiovascular system through the study of the circulation of the normal intact human being—an excellent and inexpensive audio-visual aid. Such an introduction to cardiovascular physiology is what Whitehead has called the first stage of intellectual progress—the stage of romance, to be followed by the stage of precision and analysis, in which animal experimentation is essential, and finally by the stage of generalization or synthesis. In this last stage the judicious use of examples of human, pathological physiology will condition the neophyte physician, early in his career, to think of diseases simply as deviation from normal function, rather than as entities with pathognomonic signs and symptoms.

At Harvard the students begin their course in physiology with a study of certain gross and easily observable responses of the human cardovascular system. As Dr. E. M. Landis has stressed, they learn at once, with a minimum of unfamiliar apparatus and a maximum of observation, that carefully planned, well-controlled and systematically recorded studies on man can be quantitative and revealing. They can hardly escape being interested because these studies are obviously related to their future work as physicians, and are in essence, an introduction to physical diagnosis. Confronted by the perplexing and interlocking reactions of the intact human being the student

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discovers for himself the necessity of fundamental analytical studies on simpler preparations, with fewer variables, such as the turtle heart, or the circulation in the frog's mesentery. So oriented, the student is less likely to regard the work on isolated tissues or organs as delaying, technical hurdles which must be surmounted before useful medical studies can be started. Furthermore, the order of presentation of laboratory work is even more important today than formerly since we are admitting more students who have not majored in science, and who often find the first two years of medical school somewhat bewildering and frustrating.

With these factors in mind, therefore, the laboratory has been so arranged that on the first day of the course the students learn the palpatory and auscultatory techniques for measuring blood pressure in man and then observe the effects of everyday stresses on blood pressure and heart rate. These stresses include change of posture, exercise, pain, etc. The second day is devoted to the study of the reactions of the minute vessels in the human skin—an excellent lesson in accurate observation. Here again the equipment is simple—a blood pressure cuff, a watch and a pair of good eyes. In the laboratory conferences held at the end of each of these two exercises we emphasize how much can be learned by observation and by simple experiments that can be applied to human patients. We also emphasize what is equally important—the limitations of such experiments on the intact human being. It dawns upon the student that the answers to many of his questions will be apparent only after more precise and analytical studies, which he will do in the following weeks—experiments such as the quantitative studies on the cardiac output of the turtle heart, or the investigation on the effect of alterations in venous return or peripheral resistance on the blood pressure of the anesthetized cat, etc. The final laboratory day spent on the cardiovascular system is divided between physiology and pharmacology, with a demonstration of the circulation schema in physiology as a final review, and a demonstration of the Starling heart-lung preparation by Dr. Otto Krayer in pharmacology, with an introduction to the effects of drugs on cardiac action.

As regards pathological physiology—I fail to understand the distinction so frequently drawn between alterations in function produced by physiologists, which is called physiology, and alterations produced by disease, which is called medicine. Throughout the course we use pathological physiology to recapitulate and to illustrate principles. Furthermore, we are fortunate in having the collaboration of Dr. Herrman Blumgart and his staff at the Beth Israel Hospital. Each Friday afternoon they present a voluntary clinic on pathological physiology, six of which are devoted to the cardiovascular system. The clinics are scheduled to coincide with the subject under discussion in physiology. For example, patients with heart block or arrhythmias are presented when the students are studying normal conduction in the heart. These clinics stress the application of physiological principles to medicine, and not disease classification or treatment. Great experience and wisdom are needed to make such clinics most effective, hence they are given personally by Dr. Blumgart and his senior associates.

In our cardiovascular teaching we have used a number of audiovisual aids including slides, live demonstrations, schemata and films. Our ex-

perience indicates that two types of films have been most valuable: (A) Those used for teaching of techniques, and (B) The short film, which is in essence a moving film strip. Formerly, in order to instruct a group of 35 students in the setting up of the mammalian exercise on circulation an instructor spent a half day demonstrating the method of cannulating veins and arteries, of registering blood pressure, etc. With such a large group many had difficulty in observing the procedures, and soon became bored. Today, with a film which we produced in one day, a similar group, many of whom have never before performed an experiment on a live mammal, can be taught the essentials for such an exercise in 20 or 30 minutes, and have the rest of the time for productive learning. The short films, running for only a minute or two have also been very helpful. A good example is the film of the rheoscopic heart-nerve-muscle preparation, in which the action potential of the ventricle stimulates a sciatic nerve lying across the heart, and produces a contraction of the gastrocnemius with each heart beat. Such a film not only reproduces the historic experiment of Kolliker and Müller but serves also as an excellent introduction to the electrical and mechanical activity of the heart.

The physiology course has not been the same during any two consecutive years—some modification has been made every year. The latest, and quite successful experiment has been the introduction of a two-day library exercise, an innovation which has been enthusiastically received by both the students and staff. The students are sent to the library for two full days, and they enjoy the opportunity to read more extensively on subjects of their own choice—many of which are in cardiovascular physiology.

La enseñanza de la Fisiología cardiovascular en el primer año

El Prof. A. Clifford Barger describe en este artículo, muy detalladamente, como se enseña en Harvard el curso de Fisiología cardiovascular para estudiantes de Medicina de primer año. Este curso es iniciado con el estudio de ciertas reacciones, fácilmente observables, del sistema cardiovascular humano. Tal estudio necesariamente ofrece gran interés porque está íntimamente relacionado con el futuro trabajo de los estudiantes como médicos, constituyendo, fundamentalmente, una introducción a la diagnosis física. Al enfrentarse con las reacciones sorprendentemente engranadas del ser humano, el estudiante descubrirá por sí mismo la necesidad de estudios fundamentales con preparaciones más simples y con menos variables, tales como, por ejemplo, el corazón de la tortuga, y estará menos dispuesto a considerar el trabajo con tejidos u órganos aislados como meros obstáculos en el camino hacia los estudios médicos "útiles." El autor, aunque es decididamente partidario de que se inicien los estudios de Fisiología cardiovascular con seres humanos sanos, destaca, por otra parte, las inevitables limitaciones de tales experimentos, de las que los estudiantes deben darse cuenta por sí mismos, ya que resultará obvio, después de los primeros días de laboratorio, que muchas de sus preguntas sólo encontrarán respuestas más tarde, a través de los experimentos con animales. En cuanto a la Fisiología patológica, el autor considera que no debe hacerse, como frecuentemente se suele, una distinción radical entre las alteraciones de función producidas por los fisiólogos y las causadas por enfermedades. Durante todo el curso se usa la Fisiología patológica para recapitular e ilustrar los principios básicos, combinándose estos estudios con trabajos clínicos, en los cuales se pone el énfasis en la aplicación de los principios fisiológicos a la Medicina, y no en la clasificación o tratamiento de las enfermedades. También se usa en la enseñanza cardiovascular en Harvard una serie de medios audiovisuales, siendo las películas cortas de especial utilidad, como, por ejemplo, una en la que se muestra como la acción potencial del ventrículo estimula a un nervio ciático situado sobre el corazón. Tal película no sólo reproduce el experimento histórico de Kolliker y Muller, sino que sirve también como excelente introducción a la actividad eléctrica y mecánica del corazón. Cada año se introducen algunas modificaciones en el curso de Fisiología cardiovascular. La última innovación—recibida entusiásticamente por los estudiantes—con-

siste en dos días enteros dedicados a estudios de Biblioteca, en que los estudiantes tienen oportunidad de leer más extensamente sobre materias de su propia elección dentro del campo de la Fisiología cardiovascular.

Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

DEFINITIONS*

E. Grey Dimond

Fruitful discussions by the assembled program directors resulted in improved uniformity of opinion and in understanding some of the definitions formulated by the discussion groups:

THE CLINICIAN (as defined by the clinician)—One who is concerned with the individual, his health problems, and their management.

THE CLINICIAN (as defined by the preclinician)—A physician, with a stethoscope, a large income, a large ego and a small amount of basic knowledge.

THE PRECLINICIAN (as defined by the clinician)—An individual with or without training in medicine who probably knows a great deal of data about his limited subject and who delays the medical student for two years before finally turning him over to the clinician who thereafter must try in two years to repair the damage.

THE PRECLINICIAN (as defined by the preclinician)—An individual who gives to the medical student the solid important foundation which is really the basis of medicine and who shudders at the damage created by the clinician during the final two years.

***Other definitions appear on pages 820, 823, 826, 836, 842, 845, 853, 857, 862.**

Definiciones

Durante las sesiones del mencionado Congreso sobre la enseñanza de Medicina cardiovascular fueron formuladas algunas definiciones, de las cuales se presentan aquí unos ejemplos que expresan, en vena humorística, lo que los "pre-clínicos" y los "clínicos" piensan de sí mismos y unos de otros.

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The Case for the Integrated Approach

WALTER H. PRITCHARD

FOLLOWING THE PRINCIPLES embodied in the Flexner report, the major advance enjoyed by American medical education during the past 40 years has been the introduction of the climate of the university into the medical school. Such an affiliation has broadened and strengthened both the basic science and the clinical departments with a growth in numbers of full time faculty members devoted to teaching and research. Since research activities have always commanded the greater attention, men with special interests in even small segments of science became integral and necessary members of departments, even though their time devoted to teaching might be minimal. The tremendous strides taken in scientific medicine during this period testifies to the basic soundness of the system.

Although separate and individual departments within a school may have been altogether conscientious in their teaching role, rarely has the school itself during this period concentrated any large effort towards seeking better evaluation or introducing better methods for teaching the increasing mass of scientific data produced by the system. Since the majority of investigations conducted concern foci of interests in ever narrowing fields, we are rapidly approaching the situation wherein the faculty itself may no longer see in proper perspective the parts which constitute the whole. Theories propounded by one department may already have been made obsolete by another member of the same faculty working in a different department.

It is not surprising, therefore that more than ever committees representing faculties have been scrutinizing the existing teaching programs in medical schools. Curriculum revision is under consideration by several medical schools each striving to give students the basic floor of present knowledge, to develop in the student the desire and initiative to seek out and evaluate for himself the advances that are certain to come, to develop a richer understanding of man, and to stimulate in as many students as possible the urge to make their own contributions to medicine. For accomplishing these objectives is it more rational, less expensive of students' time, and more functional to teach physiology, anatomy, pathology or pharmacology as a department discipline, or can these objectives be better met by a brief introduction to biochemistry, biostatistics and biophysics after which the major portion of the preclinical teaching is taught in terms of various body systems by faculty members with special interests in these fields irrespective of their departmental labels? There is no apparent answer to this query, nor will there be for several years. With conviction that the latter system may have merit, however, Western Reserve University School of Medi-

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cine, has adopted this approach experimentally along with other changes in the curriculum, hoping to gain insight into its possibilities.

A few general concepts about the organization of the new program should be mentioned. From its inception broad principles were decided upon by representatives of all departments and recommendations were discussed openly by the whole faculty. After much study and debate the faculty chose to discontinue the traditional departmental teaching method, substituting in its stead interdepartmental teaching units or committees developed around the various body systems. This change is realized in such fashion that all departments are concerned with the planning and execution of the teaching of these diverse areas from their inception. The first year of the curriculum deals with normal structure and function, the second year and one half of the third with abnormalities of structure and function including the principles of diagnosis and therapy. The last year and-a-half stresses the application of these principles to the clinic.

The material of each subject area is presented by a committee whose chairman is selected by an executive committee of the faculty. Committee members are appointed by heads of departments having a role in the specific teaching area. Responsibility for the content and method of presentation, including the laboratory exercises, is no longer limited to members of a given department, but is now shared by all departments represented in a teaching unit.

I shall describe the integrated teaching of the cardiovascular system under the present program since it serves as a good example of the interdepartmental teaching now under study. The cardiovascular system lends itself ideally to such an approach in as much as normal structure and function relate themselves closely and abnormalities of function are often demonstrably dependent upon abnormal structure that has been altered in several ways by disease. In the first year, during which normal structure and function are taught, the cardiovascular and pulmonary systems are combined. The responsibility of this first year falls largely if not entirely upon the departments of anatomy, biochemistry and physiology. Since the major emphasis in the cardiovascular system is upon physiology, the chairman of the committee is a physiologist. Normal cellular and protein constituents of the blood, clotting mechanisms, gas exchanges, hemodynamics, respiratory dynamics, circulatory and respiratory reflexes and hemostatic mechanisms of these systems are integrated during a total teaching time of 10 weeks. Although lectures still form the basis for presentation of material, seminars, short movies and small group conferences are proving to be excellent additions.

The number of laboratory exercises on man have been increased and certain of the more time consuming, more technically difficult, mammalian experiments have been deleted. A grant from the National Heart Institute has made possible the preparation of a series of short movies on certain basic laboratory techniques which will be required in student experiments. These have been of great help to students and have made possible a better use of the instructor's time in laboratories.

Prior to the teaching of diseases as they occur in the major systems of the body, several weeks initially during the second year are devoted to the teaching of reactions to injury and stress including physical, emotional,

thermal and radiation as well as selected infectious diseases and pharmacological agents. This introduction to disease is useful as the basis upon which each of the succeeding subject committees expands the material of its area.

During the second year the abnormalities of the cardiovascular system are treated as a unit with adult gross anatomy, pathology, pathological physiology, pharmacology, and the principles of medicine and therapeutics occupying 95 hours. This unification has required severe streamlining but the challenge has been met by placing major emphasis on pathology and its physiological implications. Therapeutic principles related to the pharmacology of drugs acting on the cardiovascular system have been stressed but details of patient management omitted. The physiology experiments, conducted acutely in dogs, have been chosen to illustrate certain of the major abnormalities encountered in the clinic. Experiments in hemorrhagic shock, cardiac tamponade, coronary artery occlusion, valvular lesions and the arrhythmias have been well performed by students. Many of the subsequent formal presentations of their results of these experiments to the whole class have been superior to some papers read at more distinguished gatherings. The laboratory in gross anatomy of the thorax taught by the department of anatomy has been segregated from the multi-discipline laboratory and has been altered little from the classical approach. Clinics demonstrating certain patients, clinical pathological conferences in which the students are the discussants, and an introduction to x-ray anatomy of the heart and great vessels comprise other features which serve as integrating mechanisms. Visual aid techniques have been introduced in greater abundance.

Physical examination of the heart in both the first and second years is taught by a clinician who serves as a preceptor of eight students for an entire year. Under his guidance they examine the hearts of their colleagues during exercises in the first year, and in the second year, interview, examine and discuss with their preceptors patients with heart diseases selected from the hospital wards. The need for relating detailed signs and symptoms in a didactic lecture diminishes greatly under such a system and more time is made available for discussing the basic mechanisms of disease.

A consecutive portion involving three days of the students' schedule is shown to illustrate the type of integration which has been accomplished.

December 18,

8:10 - 9:00	Student presentation of laboratory experiment on valve lesions.
9:10 - 10:00	Lecture—Dynamics of Valvular Lesions.
10:10 - 12:00	Clinic—Discussion—Rheumatic Heart Disease.
1:10 - 2:00	Clinical Pathological Conference—On Rheumatic Heart Disease.

December 20,

8:10 - 9:00	Student presentation of laboratory experiment on coronary occlusion.
9:10 - 10:00	Lecture — Pathologic Physiology of Coronary Artery Disease.
10:10 - 12:00	Clinic & Lecture—Coronary Artery Disease.

December 21,

8:10 - 9:00	Student presentation on shock experiment.
9:10 - 10:00	Lecture—Physiology of Shock.

10:10 - 12:00 Lecture & Movie—Clinical Aspects of Shock.

During most of the time in the final year and a half the student is assigned to clinical areas. Cardiovascular diseases are not singled out for special attention on any clinical service, but certain electives in clinical cardiology, electrocardiography, or basic research in this field may be chosen by the student. During the period of the students' basic clerkship in medicine, the patient becomes the focus and stimulus of his learning with correlation conferences held at least once weekly. Frequently such conferences bring in several departments with special interests for the evaluating of the patient's problem. In the outpatient group clinic and in the continuity clinic the same emphasis on the "team" approach is fostered, although the patient, student and preceptor constitute the unit by which the continuity of teaching is maintained. Various special groups are consulted frequently in the best interest of patient care and teaching perspective.

Certain virtues of this teaching method are evident. From the beginning each faculty member of a teaching committee is well informed of the nature and scope of the teaching area and participates actively in the teaching. By attending his colleague's lectures, demonstrations and clinics, he is better able to relate the details of his material to that previously introduced. At the conclusion the committee critically discusses the inherent difficulties which its plans have met and seeks suggestions for their solution. Each departmental representative is responsible for making certain that its material is sufficient to satisfy the need within the area, although it may be challenged by other departments if overemphasis on any aspect of the subject becomes evident. The criticism that departmental teaching responsibility has been relinquished to a group, none of whom has responsibility, is not justified. If any department within the area does an outstanding job or fails to do so, it is at once apparent. Although this is to a great extent dependent upon the individual the impact of his performance reflects within the committee upon the department itself.

Interdepartmental competition for student's time or favor has been replaced by a cooperative enterprise in which each subject committee has been allotted a share of the time. This highly integrated approach to the teaching problem has had its faculty benefits in terms of an increased understanding of mutual problems, a clarification of the responsibilities in overlapping areas, and a greater challenge to the individual teacher to perform his best.

The integrated approach has enabled the student to perceive clearly the contributions of each of the basic or clinical sciences to the solution of the problems relating to these various teaching areas. Frequently it is easier by such a system, not only to integrate what is known, but also to point out what is not known, particularly about disturbances in cellular physiology as they relate to the clinic. Many of the fundamental facts achieved through the sciences are well-known and the student should begin early to develop some concept of the extent of their application in human biology. Better interdepartmental presentations under any system will improve the students perspective in this difficult sphere. It may be unnecessary at another school to assume this more extreme position of correlated teaching, but a positive stand towards more thoughtfully planned and orderly executed curri-

cula is desirable. The system introduced by the faculty at Western Reserve has required us all to assume a more positive attitude towards our teaching responsibilities.

Student progress within this program has been more difficult to evaluate although enthusiasm, increased initiative, and a satisfactory achievement on examinations have been evident. Student performance in the preclinical years is probably appraised less well under this scheme than under the classical programs, since individual departments have now been deprived of a long and continued contact with any individual class.

Let us now ask ourselves some questions. Would it have been more interesting to us as students and perhaps more understandable to have had presented in a continuing period of time the anatomy and physiology of the coronary system followed later by the pathology of the coronary arteries and the biochemistry of atherosclerosis? Would laboratory work have been more stimulating if during this period a dog's descending ramus were tied down and the hemodynamic and electrocardiographic changes observed, recorded and discussed? Would lectures in the clinical aspects of coronary artery disease following immediately upon such a background have been more meaningful? Might this approach have better enabled us as students to interpret the patient's coronary occlusion? Will our present students' concepts of cardiovascular physiology and disease be clarified earlier in school and will they advance their knowledge more rapidly in the clinical years because of this integrated approach?

We have not the temerity to answer these questions at this early date; we have had the privilege of raising them.

***Definition*: INTEGRATION—What other departments should do with their curriculum.**

En favor de la integración

En los últimos años, más que nunca, los comités representativos del profesorado han sometido a escrutinio los programmas de enseñanza existentes en las escuelas de Medicina. Una revisión del *curriculum* se está desarrollando en varias Escuelas con el fin de ofrecer a los estudiantes adecuadas bases de conocimiento, despertar en ellos deseo de buscar y evaluar por sí mismos los nuevos descubrimientos científicos, y prepararlos para que puedan contribuir a esos advances y para descarrollar en ellos una compresión más completa del hombre. Para lograr estos objectivos, ¿sería más racional, económico y eficaz enseñar Fisiología Anatomía, Patología o Farmacología como disciplinas separadas dentro de los respectivos Departamentos, o podrían esos mismos fines ser alcanzados mejor por medio de breves introducciones a la Bioquímica, Bioestadística y Biofísica, después de lo cual la mayor parte de la enseñanza preclínica sería ofrecida, en términos de los varios sistemas del cuerpo, por miembros de la Facultad que tienen interés especial en esos campos, independientemente de su afiliación departamental? Aunque todavía no hay repuesta definitiva a esta pregunta, la Escuela de Medicina de *Western Reserve University* ha adoptado experimentalmente, junto con otros cambios de *curriculum*, este último sistema, ya que el profesorado cree tiene méritos indudables, y porque se espera poder así descubrir todas las posibilidades de desarrollo que éste tiene. En el presente trabajo se describe detalladamente en qué consiste la enseñanza integrada en el campo de la Medicina cardiovascular, que se amolda especialmente bien al nuevo sistema. En resumen, la integración de la enseñanza cardiovascular se presenta de este modo: En el primer año, durante el cual se enseña estructura y funciones normales, se combina la enseñanza de los sistemas cardiovascular y pulmonar. Los Departamentos de Anatomía, Bioquímica y Fisiología asumen, durante este período, gran parte de la responsabilidad. El director del programa es el jefe del Departamento de Fisiología, ya que el énfasis, dentro del sistema cardiovascular, se halla en esta última. El período de enseñanza dura 10 semanas. Aunque las clases-conferencias constituyen todavía la forma básica para la presentacion de material, seminarios, películas cortas y discusiones en grupos pequeños

han resultado adiciones valiosas. Se ha aumentado el número de los ejercicios de laboratorio, y una subvención del *National Heart Institute* ha hecho posible la preparación de una serie de películas cortas sobre ciertas técnicas básicas de laboratorio. En el segundo año, las anormalidades del sistema cardiovascular son tratadas juntamento con la Anatomía elemental, Patología, Fisiología patológica y Farmacología, con el énfasis en la Patología y sus implicaciones fisiológicas. También se han destacado, sin entrar en detalles de tratamiento, los principios terapéuticos relacionados con la farmacología de drogas que actúan sibre el sistema cardiovascular. Los experimentos de Fisiología, llevados a cabo con perros, fueron seleccionados a fin de ilustrar ciertas anormalidades mayores encontradas en la clínica. El curso de laboratorio en Anatomía del torax, del Dept. de Anatomía, fué segregado de los otros ejercicios y sufrió muy pocos cambios. Durante la mayor parte del tiempo, en el último año y medio, los estudiantes son asignados a las áreas clínicas, donde las enfermedades cardiovasculares no reciben atención especial, aunque los estudiantes pueden escoger asignaturas en cardiología, electrocardiografía o investigación básica en ese campo. Durante ese período, el paciente es el principal foco de enseñanza; pero hay seminarios relacionados con los trabajos clínicos cada semana, en que participan varios Departamentos especialmente interesados en la evaluación de los problemas de un paciente. El autor señala las varias ventajas que resultan de tal enseñanza integrada, tanto para el profesorado como para los estudiantes. En términos más generales, concluye que la Facultad ha logrado así una comprensión mejor de los problemas mútuos; un deslinde de responsabilidades y un más fuerte estímulo para enseñar, cada uno, lo mejor que pueda. Los estudiantes, por otra parte, han sido capaces de percibir más claramente las contribuciones de cada una de las ciencias básicas o clínicas en la solución de los diferentes problemas. Tambien resultó así más facil no sólo la integración de lo conocido, sino también el señalar lo que aún no es conocido, particularmente en el campo de la fisiología celular. Aunque es difícil evaluar el progreso de cada estudiante dentro del dicho sistema, el entusiasmo, la mayor iniciativa y lo satisfactorio de los trabajos han sido evidentes.

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The Separate Organization of Teaching By Departments

GEORGE C. GRIFFITH

MEDICAL EDUCATORS—we in the field of cardiovascular medicine in particular—are especially concerned with the problem of imparting the vast body of present-day knowledge to our students in the most efficient manner possible. The suggestion has been made that responsibility for medical education be taken out of the hands of the department head and placed, rather, in the hands of a committee of educators expert in the various phases of medicine to be covered in the term's study. Perhaps the time has come to re-examine the basic tenets of medical teaching—to determine whether tools now in use are best suited to the job at hand.

To my mind, the question of placing responsibility and planning for the curriculum in the hands of a single department head and his staff—as opposed to making a committee of experts accountable for education of the physician-to-be—parallels to a considerable extent the problem of determining the province of the personal physician as opposed to that of a group of consulting specialists. The

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great majority of physicians would agree that the long-term medical care of the individual is the province of the personal physician, who is in the best position for over-all appraisal of the medical picture. If the patient will benefit, a specialist or several specialists may be called in to make their unique contributions, but direction of treatment properly remains in the hands of the personal physician. In like manner, the department head is best placed for directing the over-all educational blueprint—selecting the subject matter, assuring incorporation into the curriculum of all essential information, determining the most efficient methods for imparting both information and basic medical concepts, and devising means for encouraging students to marshal and evaluate facts upon which treatment will be based.

For efficient teaching, each step must serve as foundation for each succeeding step—easily accomplished when one competent person is fully answerable for coverage of all material, but difficult in practice when responsibility for coverage is split among a group of persons, no matter how expert each is in his own field. Finally, in the clinical years, the department head—through a well-coordinated program of opportunities for observation, diagnosis and management—can best plan for the student to meet with the full scope of medical experience. The choice of patients, the opportunity for ward service and clinical work by the student—these are coordinated by the department head and directed by his associates in a manner which prevents duplication of case studies and makes clinical disease entities available in logical and orderly sequence.

Once we are agreed that teaching is best accomplished through selective direction and planning by a department head and his staff, the next question to come to mind is the place of the textbook and the lecture, the former two mainstays of education, in the present situation. Does the lecture remain, as formerly, the best means of imparting facts to the student, of charting the important guideposts and milestones in medical knowledge? Is the textbook dated and outmoded, or does it retain its peculiarly important position in the teaching of medical subjects?

It is the exceptional student indeed who would be able to work his way through the huge number of medical papers published each year and assemble for himself the information needed to prepare himself for the practice of medicine. The textbook is a compendium of the most important information in easily assimilable form; the lecture serves to underscore important relationships and provides a framework upon which multitudinous facts may be assembled into a comprehensible whole. Of course the student should be encouraged to ferret out facts for himself, to read medical papers and to learn to evaluate experiments and studies from the published reports of these studies. Together with attendance at medical gatherings, reading of selected journals will be the graduate physician's only method of keeping up with developments in medicine. But first the student must make the basic facts his own: the lecture and the textbook provide the most economical means of doing so.

For the same reasons as I have—earlier in this paper—strongly recommended direction of the course of study by a single department head, I now recommend the placing of the lectures in the hands of a single educator, with an occasional invitation to a specialist to speak on his specialty if this is deemed advisable. Com-

monly, when several persons—however competent—are brought together to teach a single course, each has only a hazy idea of the preparation of the students before him. It is altogether likely, under these circumstances, that the lecturer of the day either will *overestimate* the preparation of the students—giving them facts for which they have not been properly prepared and which they are, therefore, incapable of appreciating to the fullest, or *underestimate* the student's preparation, wastefully repeating facts already known. Persons advocating the so-called integrated approach suggest that each lecturer attend his colleague's lectures, demonstrations and clinics, better to relate details of his material to that previously introduced. True, this would cut down the overlap and assure coverage of most important material, but how wasteful of the educators' time! How much easier and more economical of both faculty and student time and effort if a single person directs all of the teaching. Not only does the lecturer's close contact with the students permit him to gauge the preparation of his students and thus to determine the point at which the next topic can be taken in stride, but it is my considered opinion that the impact of the lecturer's personality on the students' interests and efforts constitutes no small part in the learning experience—driving home information, kindling interest in subject matter heretofore uninteresting, and motivating the student to undertake additional study on his own. It is not until the student enters the clinical phase of medical education that the subject under study—the patient—replaces the lecturer as the important motivation to self-instruction. Nevertheless, the directive influence of the department head does not cease at the threshold of the clinical years: in these years above all the student benefits from the efforts of the department head to provide him with varied and orderly experience.

***Definition:* THE CURRICULUM—The unreasonable demands placed upon the student by other departments.**

La organización de la enseñanza por medio de Departamentos separados

Los profesores de la Medicina cardiovascular están tratando de encontrar los métodos más eficaces de impartir a los estudiantes los vastos conocimientos que hoy se poseen en este campo. Como los partidarios de la integración de esa enseñanza han sugerido que la responsabilidad por los programas de estudios debería pasar de las manos de cada jefe de Departamento a las de los miembros de un comité de educadores expertos en las varias disciplinas médicas, el Dr. G. C. Griffith vuelve a examinar, en el presente trabajo, los principios básicos de la actual enseñanza médica para determinar si los métodos hoy aplicados son adecuados o no. Equiparando la cuestión de quien debe asumir la responsabilidad por la elaboración del programa de enseñanza al problema de determinar la autoridad del médico de familia en el tratamiento prolongado de un paciente frente a la autoridad de los especialistas consultados, el autor cree que el jefe de Departamento es la persóna más adecuada para dirigir el plan general de estudios en su campo. Si la enseñanza ha de ser eficaz, cada paso ha de servir como fundamento para cada paso próximo, y esto, arguye el Dr. Griffith, se logra más fácilmente cuando una sola persona competente es plenamente responsable por el programa de enseñanza que cuando esta responsabilidad se halla dividida entre un grupo de profesores, por muy competente que cada uno de ellos sea en su propio campo. En cuanto a los métodos de enseñanza, que también deberían ser sujetos a reforma según los partidarios de la integración, el autor rechaza la sugerencia de que cada profesor que dicta un cursillo debiera asistir a las conferencias, demostraciones y a las clínicas de sus colegas, a fin de poder relacionar mejor su material de enseñanza con el que se ofrece a los estudiantes en otras clases. La gran pérdida de tiempo que tal sistema significaría para los profesores no sería compensada, según el autor, por la pequeña ventaja de que así se evitarían a veces repeticiones supérfluas. "Cuánto más facil y más económico," dice,

"para ahorrar tiempo y esfuerzo, tanto al profesorado como a los estudiantes, el que una sola persona dirija toda la enseñanza." Cada cursillo debe, en la opinión del autor, ser dado por un solo instructor, invitándose sólo ocasionalmente y cuando parezca muy indicado, a otro profesor especialista para hablar de un problema específico. Siendo un profesor determinado el que únicamente dicta un cursillo, puede establecer un íntimo contacto con sus estudiantes, lo cual le permitiría determinar si están preparados o no para avanzar en la materia. Y no hay que olvidar que la personalidad del profesor es un factor decisivo cuando se trata de despertar el interés de los alumnos y dirigirlos a emprender determinados estudios independientes. Sólo cuando el estudiante empieza el trabajo clínico, puede el paciente substituir al profesor en lo que se refiere al estímulo para buscar nuevos caminos que enriquezcan sus experiencias. Sin embargo, la influencia dirigente de un sabio jefe de Departamento no cesa con la fase clínica: es precisamente en esos últimos años de los estudios, concluye el autor, cuando los estudiantes se benefician de los esfuerzos de un director de Departamento que procura que la enseñanza sea metódica, sólida y variada.

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Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

The Teaching of Preclinical Sciences by Clinicians

RICHARD H. LYONS

THERE APPEARS to be a renaissance of interest in having the clinician participate in teaching the preclinical sciences. Two reasons are behind this. One is the shortage of preclinical instructors and the second is an attempt to present the clinical applications of the basic sciences. This participation of the clinician is by no means new. A century ago with the organization of the American Medical Association, the medical schools in an effort to improve medical education were gradually released from the undergraduate program of universities and permitted to establish their own departments of science taught almost entirely by clinicians.

Oliver Wendell Holmes, one of the early leaders in the emancipation of the medical schools from the universities, might serve as an example of the versatility of our forebears. As a clinician he not only led this country in the epidemiological considerations of puerperal fever, but also simultaneously served as dean of Harvard Medical School, professor of anatomy and physiology as well as secretary of the Tremont Medical School and instructor in physical diagnosis. This attempt to have clinicians teach science was rather short lived and at Harvard as well as at other universities throughout the country higher university authorities imposed sweeping reforms on the medical faculties and scientific departments were established within the medical school against the wishes of the clinicians. As scientific knowledge developed through research in basic science laboratories, the clinical teachers of medicine generally failed to apply this knowledge and a large intellectual gap developed between the medical scientist and the clinician.

The empirical approach of the clinician at the turn of the century

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tended to reject the newer concepts of physiology and pharmacology so clearly demonstrated by medical scientists. The clinician satisfied his intellectual activity with precise predictions of the findings at the autopsy table and he had little motivation or knowledge to explore the abnormal physiology of disease.

Thus we have a heritage of a separation of the medical sciences from the practice of medicine that has been difficult to overcome in spite of the tremendous advances in the past generation. New fields of endeavor have been recently established which might be called clinical physiology, clinical pharmacology, clinical chemistry, etc. which are intimately related to the preclinical sciences but applied to man by "clinicians" who have utilized the scientific techniques developed by their colleagues in the basic sciences.

Because of the demand for practicing physicians, there has always been a shortage of physicians interested in preclinical science and an inadequate supply of suitable teachers of these subjects. The need has partially been met over the years by the development of scientists who have not been interested in clinical medicine but who have found intellectual satisfaction in their own special field.

It would thus seem that through the years of medical education, which a century ago was released from the "university scientist" by the American Medical Association, has to a considerable degree returned to the nonclinical medical scientist for its basic instruction. Since a new group of clinical scientists seems to be flourishing at the moment who are moderately well equipped to utilize the tools and knowledge of the preclinical scientist, it might seem reasonable to have them again take over the instruction of the medical student as did Dr. Holmes and his colleagues.[1]

The heritage of American medical education today expects that the student should be grounded in the scientific attitudes whether these be developed by physicians or others. It would seem to be a healthy heritage providing this approach can be carried to the bedside. The distance between preclinical science and clinical science is becoming progressively smaller and there is a tendency to fusion.[2] It should be pointed out, however, that though this tendency may be present at the research level it is not necessarily always present at the level of clinical teaching of the undergraduate due to the continued empiricism of the clinician with his "tried and true" methods, and his own inadequate education as a scientist.

In the present overcrowded medical curriculum, each department has too little time to expose the student adequately to its disciplines and the necessary language of its science. The details of each course are carefully selected so that the student may receive as broad a perspective of the science as possible within a given time. The student should be led to see the forest, not to become engulfed in the details of the trees. Insofar as the clinician can help in leading to a broader understanding of

1. Those equipped to use the tools are common—those with the knowledge are common. Those who apply the *method* to their thinking and teaching are *rare* and *far too expensive* for present day medical school finances. *Ed.*

2. This fusion needs to be two way. The scientifically oriented clinician needs the help of the clinically oriented scientist at all levels of his teachings. *Ed.*

the significance of special aspects of a preclinical science he should be used. He must be careful, however, not to introduce in such discussions the extraneous language and cultures familiar to the clinician but foreign to the preclinical student. Too frequently clinicians are asked to participate in a preclinical science because of the excellence of their basic research in a narrow field. Though their discussion may be enjoyable and meaningful to the preclinical faculty, its effect is often lost on the undergraduate who is not familiar with either the language or the phenomena elucidated. The clinician in his enthusiasm of a preclinical presentation may give irrelevant detail or fall into a clinical jargon which may seduce the students' interest but not their understanding. Thus, time may well be wasted with the introduction of clinicians in preclinical sciences before the proper language is understood by the undergraduate. Correlation clinics may be strictly limited to that purpose by a well chosen clinician who speaks with an appropriately simple tongue.

Correlation clinics have more value after the student has learned principles and language of the preclinical sciences as well as some of the language of the clinician. The use of the tools of the preclinical sciences should be exhibited at each bedside so that the basic principles learned by the student in his earlier years can be re-enforced.

Finally, there may be more than pedantic danger in having the clinician participate in anything but casual teaching of the preclinical sciences. Especially in this country there is already too much emphasis on applied science in all fields. If the teacher of preclinical science should be gradually displaced by clinicians who are primarily applied scientists the well of fresh knowledge may soon become salty. Some schools may be forced to use clinicians in preclinical teaching because of budgetary difficulties or because of the shortage of suitable personnel. This is a serious defect but this bitter pill should not be sugar-coated by the hypocritical belief that the practical clinician is better equipped to teach the preclinical sciences than the basic scientist.

***Definition:* THE STUDENT—One who must be taught even though it interferes with the research program.**

La enseñanza, por profesores clínicos de las ciencias pre-clínicas

Recientemente se ha despertado otra vez el interés por la participación de los clínicos en la enseñanza de las ciencias pre-clínicas, debido, por una parte, a la actual escasez de instructores en el campo pre-clínico, y, por otra, a la tendencia de presentar a los estudiantes las aplicaciones clínicas de las ciencias básicas. Esta participación de los clínicos en la enseñanza de las ciencias básicas no es nueva, pues fué introducida por vez primera cuando, hace un siglo, se organizó la *American Medical Association*, y cuando las Escuelas de Medicina, en un esfuerzo por mejorar la Educación Médica, se fueron liberando, gradualmente, del programa para no graduados de las Universidades, estableciendo sus propios Departmentos de Ciencia donde éstas se enseñaban casi exclusivamente por profesores del campo clínico. Sin embargo, tal situación duró poco tiempo. En la medida en que se desarrollaron los conocimientos científicos, a través de las investigaciones de laboratorio, en el campo de las ciencias básicas, los profesores de Medicina clínica dejaron de aplicar esos conocimientos, y se fué abriendo un abismo intelectual entre el médico científico y el clínico. Pero más recientemente los nuevos campos de la Fisiología, Farmacología y Química "clínicas" se hallan íntimamente relacionados con las ciencias pre-clínicas, aunque aquéllas sean aplicadas por los "clínicos", que utilizan las técnicas científicas desarrolladas por sus colegas en el campo de las ciencias básicas. Así la distancia entre ciencias pre-clínicas y clínicas se está haciendo cada vez más corta, y se tiende a la fusión de ambas. El autor señala, sin embargo, que esta tendencia, mani-

fiesta en el nivel de la investigación científica, no está necesariamente siempre presente en el nivel de la enseñanza clínica de los estudiantes no graduados, debido al persistente empiricismo de los clínicos y a su propia insuficiente educación científica. Se recomienda en este artículo que se haga uso de los profesores clínicos en la medida en que ello puede contribuir a una comprensión mejor de ciertos aspectos de las ciencias pre-clínicas. Mas debe tenerse cuidado de no introducir en tales discusiones lenguaje y elementos familiares en su campo, pero desconocidos para los estudiantes pre-clínicos. Hay definitivamente un peligro, concluye el autor, en la participación de los profesores clínicos en la enseñanza de las ciencias pre-clínicas, porque en este país se pone ya demasiado énfasis en la ciencia "aplicada". Si el instructor de las ciencias pre-clínicas quedase gradualmente desplazado por el instructor clínico, que es primordialmente un hombre de ciencia "aplicada", podrían secarse las fuentes de conocimientos "frescos". La necesidad en que se encuentran algunas Escuelas de valerse de clínicos en la enseñanza de ciencias pre-clínicas, a causa de la escasez de personal o de dificultades financieras, no debería, en todo caso, ser justificada por la hipócrita tésis de que el profesor de Medicina clínica está mejor preparado para esa enseñanza que el profesor de Ciencias básicas.

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Cardiovascular Teaching from the Anatomist's Viewpoint

ERNEST LACHMAN

ALTHOUGH ANATOMY seems basic enough to serve as a foundation of cardiovascular teaching, we realize that in medical school we have to build on attitudes and concepts which the student has acquired in college preceding his entrance into medical school. The biological sciences have given him an understanding of the phylogenetic and ontogenetic development of cardiovascular conduits. The humanities and social sciences, if they have fulfulled their purpose, have offered him an insight in human suffering and a grasp of the importance of human relationships. Both teaching areas will have laid the groundwork for his future studies in the basic sciences and his work with patients in the clinical years.

While anatomy thus forms a bridge between the student's college years and the start of his medical career, it serves the singular function of teaching the student the basic philosophy of all scientific work, i.e., to gather his data from personal observation and interpret these observations in the light of known facts. This will lead him to a true comprehension, not memorization, of biological principles.

In this respect the study of human morphology fulfills an ideal purpose. Anatomy, taught properly, will give the student, for the first time in his training, a chance to function as an independent investigator who explores the unknown before him by simple but nevertheless not too easily mastered methods. The gratification thus obtained will strengthen his motivation in the pursuit of his medical studies.

Coming to our specific subject, the

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teaching of cardiovascular anatomy, the question might readily be asked: has there been any fundamental change in the teaching of this area in the last 20 years? I should like to answer this question in the affirmative. The change lies in the basic concepts underlying our teaching of cardiovascular topography. Classical topographic anatomy, as represented in our textbooks of anatomy, assigns to each organ, including the heart and major vessels, its allotted place in the body. It is based on findings in embalmed or frozen cadavers in which the diaphragm is maximally elevated and the lungs are in a state of forced expiration. It disregards morphologic and physiologic factors that result in deviation from the so-called standard position. By contrast radiologic exploration of the living has developed a dynamic concept of visceral position which, for the heart, takes account of such variables as respiration and body posture, location of the diaphragm, state of filling of the abdominal viscera, including the pregnant uterus, and body type and constitution, the latter incorporating height and weight. Every description of cardiac topography has to be qualified by specifications representing the foregoing factors.

If, for purposes of simplification, a single standard diagram of the surface projection of the heart is desired, it should represent the heart in the living as revealed radiographically, preferably in the erect, i.e., the "anatomical" position. Here we find the heart considerably more caudal than in the cadaver. Particularly striking is the location of the inferior cardiac border which crosses the midline approximately 4-5 cm. below the xiphisternal joint. Thus, the sterno-costal surface of the heart, in the erect subject and in midinspiration, lies with at least one third of its area below the xiphisternal joint in the midepigastrium. The latter might be referred to quite properly as the pit of the heart rather than of the stomach.

Surprisingly these findings have been ignored so far by textbooks on physical diagnosis which still illustrate their presentation of cardiac surface anatomy by timeworn diagrams from the classical era.

To make our students aware of a more fluid approach to anatomical norms we let them execute—as part of their course in x-ray anatomy for sophomores—certain cardiac and thoracic measurements on the roentgenogram of their own chest. They then evaluate these measurements in terms of available prediction tables correlated with body height and weight. This information furnishes valuable anthropological data on normal subjects of a certain age group for investigative purposes; but, first and foremost, it brings home to the student the problem of constitutional variation in anatomy and thus introduces him to a new and more dynamic concept of human morphology.

Thus, in spite of a greatly reduced teaching schedule in anatomy we are able to incorporate in our program the educational principles which have been outlined in the earlier part of this paper.

El punto de vista del anatomista en la enseñanza de la Medicina cardiovascular

¿Ha habido un cambio fundamental en los últimos veinte años en la enseñanza de la Medicina cardiovascular? El autor del presente artículo cree que sí. Este cambio, según él, se refiere sobre todo a los conceptos que son base de la enseñanza de la topografía cardiovascular. La Anatomía clásica, de los libros de texto, asigna a cada órgano, incluso al corazón y a los vasos, un determinado lugar dentro del cuerpo, sin tener en cuenta los factores morfológicos y fisiológicos que producen una desviación de la llamada posición "standard." La exploración radiológica del

ser vivo, por el contrario, ha desarrollado un concepto dinámico de la posición visceral, que, en lo que se refiere al corazón, toma en cuenta variables tales como la respiración y la postura, localización del diafragma, estado de las vísceras abdominales (incluyendo el útero durante el embarazo) y el tipo y constitución del cuerpo. Cualquier descripción de topografía cardiaca ha de ser específica, teniendo en cuenta dichos factores. Al final del artículo, el autor describe algunos métodos (especialmente el uso del fluoroscopio y de la radiografía) para introducir a los estudiantes a esos nuevos y más dinámicos conceptos de la morfología humana, los cuales suelen ser ignorados en los libros de texto.

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Roentgenology in Cardiovascular Teaching

CHARLES T. DOTTER

DR. LACHMAN has advocated the use of the fluoroscope and radiograph to give the student a concept of anatomy in the living. These tools are equally applicable to the study of cardiovascular function and to the identification of disease processes. Radiography offers a direct access to the cardiovascular structure which can make more vivid the mental image provided by the stethoscope or the electrocardiogram. Students who observe fluoroscopically an atrioventricular dissociation carry away an impression difficult to match in clarity.

By the use of contrast media the radiograph can bring the student a point blank picture of vascular conditions that must be inferred from other more or less reliable indices—cerebral vascular aneurysms, anomalies in the heart and lungs, esophageal varices, aortic aneurysms, etc. Currently there are encouraging signs in the search for a contrast medium which shows up as particles. Their ability to demonstrate patterns of flow and turbulence would add a new dimension to the teaching of cardiovascular physiology.

Dr. Dotter is professor and head of the department of radiology at the University of Oregon School of Medicine.

La Radiografía en la enseñanza de la Medicina cardiovascular

El Dr. Charles T. Dotter recomienda el uso del fluoroscopio y la radiografía en el estudio de la función cardiovascular y en la identificación de procesos patológicos, y discute las ventajas de ese método de enseñanza.

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Cardiovascular Teaching from the Point of View of the Biochemist

WENDELL H. GRIFFITH

I HAVE THE UNEASY feeling that, by some miraculous feat, I should be able to recite glibly a method of instruction which elegantly prepares medical students for a complete understanding of the biochemical aspects of the cardiovascular system in health and disease—and, in addition, qualifies them in biochemistry for research in the field.

It must be confessed that my ideas about biochemical instruction in this area are no more fixed than my ideas about teaching biochemistry. The latter have been constantly changing now for 33 years—changing in the hope that a still more productive way might be found to expend the time allotted by the curriculum committee.

The problem of the teaching of cardiovascular biochemistry and of biochemistry is essentially the same, except in degree. It is a problem of a vast array of fascinating facts which too frequently refuse to fall into orderly arrangement, a resulting paucity of universally accepted laws or principles and, a failure on the part of ourselves as instructors in being able to interest sufficiently a student whose motivation may already have been fixed in a pattern not susceptible to ideas which have no immediately obvious relation to clinical medicine. It is no help, of course, to find lack of agreement, even acrimonious dispute, on the effect on the vascular system of the ingestion of one of the biochemist's oldest standbys, cholesterol. It is probably a matter of some pertinence to the discussion that the uncertainty about the role of exogenous cholesterol weakens the confidence of some beginning students in the biochemical approach whereas it becomes a challenge and a spur to further study after students have been introduced to the methodology of the detection, prevention and treatment of cardiovascular disease.

Any discussion of the problem of improved instruction about the heart and its functioning quickly becomes enmeshed in the over-all problems of:

(1) The selection of otherwise qualified applicants who really thirst for knowledge;

(2) The wise and sympathetic handling of the student after admission so that his desire to learn is fostered, not blighted;

(3) The arrangement of a curriculum and assignment of hours to competent instructors so that there will result, in most instances at any rate, a superior training of future practitioners of medicine.

That a Utopia has not been reached in these respects is evidenced by the discussions at this conference. The solution of these problems determines in part the allocation of time for individual subjects and the opportunity for interdepartmental integra-

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tion. The problem of the motivation of the student is more difficult because this is not under the control of the faculty. It depends on the influence of the home and is modified by schools and other environmental factors. Schools of medicine cannot afford to disregard this problem. Competition for really good students is keen—and it is within the realm of future possibility that the profession of medicine may be compelled to support campaigns to attract a sufficient number of the best qualified scholars to its ranks. This is a problem also facing the basic medical sciences, including biochemistry.

But what of instruction in cardiovascular biochemistry in the department of biochemistry at UCLA? We are completing our fourth year. As a new school, have we found new and different ways of overcoming the hazards mentioned previously. Some progress has been made. Although there is a dearth of unequivocal evidence on the advantages or disadvantages of so-called block instruction in the case of adults, it is my own belief that the subject of biochemistry is too broad in its application and too new to the students to expect them to appreciate its role in medical science if it is taught in a single semester of the first year. Especially is this true if it is a *first* semester subject. On the other hand, the same or even fewer hours spread over two semesters allows time for assimilation and correlation, correlation in fact with both anatomy in the first semester and physiology in the second.

Our teaching includes the composition of tissues, the nature of the constituents, and the chemical basis, if known, of the controlling mechanisms that permit the maintenance of cellular integrity and the functioning of the whole animal. In general, we have not treated organ systems as individual topics. The chemistry of muscle and of the energetics of contraction have not distinguished between skeletal and cardiac muscle. Certainly, the stimulus of this meeting has made me more conscious of this particular problem and I have considered how we might make discussions of cardiovascular biochemistry more distinctive. One thinks at once of the unusual items, such as the occurrence in the heart of lyxoflavin, a stereoisomer of riboflavin and of cardiolipid, that bizarre combination of fatty acids, glycerol and phosphoric acid. Important, certainly, is the use of lactic acid as a fuel in contrast to skeletal muscle which does not use this product of anaerobic glycolysis. Important, of course, is the unique sensitivity of cardiac actomyosin to the cardiac glycosides. It is a moot question whether these and other differences are sufficiently outstanding in the face of the general metabolic similarities to justify separate discussion.

On the other hand, we have made a definite effort to emphasize separately certain nutritional findings of importance to the heart and to the vascular system. Included are thiamine deficiency and the beriberi heart, the strange pathological effect of lauric acid esters in low-choline diets, the relation of dietary neutral fat and of cholesterol to vascular disease, the electrolyte disturbances that call for low-sodium regimes and the general significance of that prevalent form of malnutrition which we call obesity.

In connection with the discussion of nutritional factors in heart disease we have made a special effort to recapture the initiative for education in proper eating from the miscellaneous proponents of this or that form of immoderation or extremism who have taken over the field. It is unfortunate

that this important area of medicine has gone by default to uninformed groups in so many localities.

No questions have been answered in this brief statement of an interested biochemist. The opportunity to participate in the discussions of the conference and to learn from them is highly appreciated.

El punto de vista del bioquímico en la enseñanza de la Medicina cardiovascular

El problema de enseñar Bioquímica cardiovascular es, dice el Dr. W. H. Griffith, fundamentalmente el mismo que para la Bioquímica en general. En este campo, hay abundancia de datos que no es fácil integrar en un sistema; una escasez de leyes o principios universalmente aceptados, y una gran dificultad, para los instructores, de interesar a ese tipo de estudiante poco entusiasta por las ideas que no tengan una manifiesta relación con la Medicina clínica. La enseñanza de la Bioquímica cardiovascular en el Dept. de Bioquímica de la UCLA (Universidad de California, en Los Angeles), cuyo programa acaba de cumplir 4 años, ha logrado, según comunica el autor, progresos notables hacia la solución de dichos problemas. En vez de enseñar Bioquímica en un solo semestre el primer año, esa enseñanza se reparte en dos semestres, lo cual permite una mejor asimilación del material, y una conexión de éste con la Anatomía y la Fisiología. El programa abarca la composición de los tejidos, la naturaleza de los constituyentes y la base química del mecanismo de control que permite el mantenimiento de la integridad celular y el funcionamiento de todo el animal. Por lo general, los sistemas del organismo no han sido tratados como temas individuales. Por otra parte, se ha hecho un esfuerzo por poner énfasis en ciertos descubrimientos, relativos a la nutrición, importantes para el corazón y el sistema vascular.

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The Role of Biophysics as a Department of Instruction in a Medical School

ERIC OGDEN

IT SEEMS EVIDENT and widely agreed that the medical student's training demands some biophysics in at least three of its aspects. These are: Physical instrumentation; the response of the body to physical agencies; and the use of physical theory to rationalize and coordinate complicated physiologic and pathologic behavior as seen clinically.

Before considering the relative merits of different methods of offering this instruction a little elaboration is in order.

Dr. Ogden is professor and chairman of the department of physiology at Ohio State University.

Physical instrumentation

From the knee-hammer to the magic grey electronic box with black knobs, the physician and his aides are constantly using physical instruments. Although the simpler instruments such as the mercury sphygmomanometer are clear enough in their principle and construction that any physician could diagnose their

ailments and repair them yet he has no need to waste his time on the instrument-maker's job.

As for the more complex pieces of equipment such as electromanometers or electrocardiographs, very few physicians have the knowledge or skill to tamper with them. Indeed, why should they? The instrument makers claim to make their equipment foolproof—even nurse-proof, but to their dismay they cannot make them doctor-proof since many doctors carry screwdrivers! Why then, should the physician have any instruction in physical instrumentation? First, he must decide which physical instrument to obtain for his own use. Against the convenience of a direct writer some instrument salesman may persuade him of the advantages of the more costly (or more "marked up") string galvanometer on the grounds of "superior frequency characteristics." He is likely to say that all the better big city clinics are going back to photographic recording without adding that this is only for certain research purposes or unusual diagnostic problems. To whom shall the physician turn for advice? After all, the salesman's job is selling; it is the physician's job to select the instrument best fitted for his needs. And it is he too, after selecting it, who must know its capacities and limitations not only as set forth in the manufacturer's technical bulletin but also as they will affect his interpretations of the data he obtains. Further, is the physician to take on trust the appropriateness of the instrumentation when he reads research reports or annual reviews of advances in his specialty? Time, and the limitations of his training, dictate that he must usually entrust his faith to the author's good name or to the institution of origin. Yet medical writings read with informed criticism convey more useful information than those that are passively accepted because they come from the pen of the great Sir George Holster or out of the famous clinic of the Kayo Sisters.

Nor is the electrocardiograph the only instrument to which the above considerations apply. The medical student had better have an introduction to the principles of instrumentation.

The effects of physical agencies

Here is a field where few would argue against the need for knowledge. The question is rather "how much?"

Instruction in physical therapy and radiation therapy is usually offered by people who are well informed in the biophysical background of their work; but commonly they lack either the time or the training to ensure a good fundamental understanding by students whose habit of welding their knowledge of physical and biological matters is insufficiently established. Moreover, curricula commonly omit recognition of the fact that many important effects of physical environment lie outside the present scope of physical medicine. As examples let us cite climate, ventilation, solar radiation, high volume sound, vibration, etc.

Physical aspects of biologic phenomena

It is in this area that controversy rages most hotly. Each specialist in presenting his approach to care of patients is impressed with the axiomatic nature of some of the physical theory underlying his work. This is inherent in much of the terminology such as: compression fracture, dependent edema, cranio-pelvic disproportion and in the thinking about straightforward phenomena such as

the deformities of rickets. Many clinicians see no need for special training in biophysics since physical matters are often rated on a subconscious scale of "obvious," "common-sense," "basic anatomy and physiology," "high school physics;" or if they have been matters of recent important investigation in the clinician's own special area they may be presented in such a way that some students feel they are new research matters divorced from any principles or knowledge he may already have.

Why then, many ask, should the student's time be further taken by a new-fangled discipline—biophysics?

The teaching of biophysics

The foregoing paragraphs present the viewpoint that medical schools need instruction in biophysics and, one way or another are getting it and have been for years.

But the recent introduction of courses, divisions and departments of biophysics in many schools points up the questions: Are they getting enough instruction? Are they getting efficient instruction? And, this mostly from biophysicists? Are they getting it right?

Evidently, the application of biophysical approaches to the understanding of clinical phenomena can best be achieved if the mind of the clinician has acquired the habit of physical analysis of his observations. This places this training squarely in the preclinical or premedical years. More will be said about this later.

The other two aspects, instrumentation and the effects of physical environment on clinical problems can probably be most efficiently accepted by medical students close to the end of their fourth year in the form of a brief review course organized and dominated by a biophysicist, but given in large part by physicians whom the students have already met in the practical and partly empirical application of these matters. The theory of instrumentation briefly presented by a biophysicist would be followed by brief practical discussions or demonstrations by, for instance, a radiologist on the factors involved in selection and performance of x-ray equipment, a cardiologist on ECG machines, a clinical pathologist on microscopes, colorimeters, meters and other physical equipment likely to be found in the small clinical laboratory.

The basic generalities of the effects of physical changes on the body, presented for continuity and point of view by a biophysicist, would be followed by brief reviews of the applications of these generalities by the professor of medical physics or physical medicine and other appropriate clinicians with whose work the student has already some operational experience.

Many biophysicists disagree with these proposals of tying previous experience and teaching together with a terminal review course and would prefer to see a unified preparatory course covering this material systematically before it is encountered in clinical instruction. Perhaps major individual differences in learning habits determine the proper answers to this conflict. We should try to find and aim at an "average" student among a population of two different kinds.

Training in the habit of the physical approach

Many who have given thought to this question believe that this training should begin with a thorough

grounding course in the premedical curriculum probably a course in "biologic examples of physical principles" taught by a physiologist, biologist or biophysicist in close correlation with the course in college physics. Those who think this way are properly insistent that the thought-patterns inculcated must be constantly reinforced wherever possible during the whole of the future physician's training. Many who advocate this approach would like to think of pushing this type of thinking back into high school on the general ground that fundamental habits and methods of approaching problems tend to stabilize early in life and to become progressively harder to change.

Regardless of the merits of this view, most of us who are concerned with medical education are in a much better position to make steps toward a goal if the pathway can be made within the four year curriculum even though a possibly better path may lie in areas over which we have less direct influence.

Among those who are convinced that the fundamental biophysical approach needs more attention in medical schools there are significant variations in opinion as to how this should be achieved.

Some advocate a course in the beginning of the freshman year reviewing classical physics, quantitation and mensuration and presenting biophysical principles. To such a groundwork instructors in all subsequent courses would make specific reference whenever possible.

Others advocate a separate course in biophysics running concurrently with physiology. This would emphasize the physical approach of the matters covered each week in physiology and when the physiology course was on strictly biological or chemical ground the biophysics course would take up the more general matters including the physical groundwork for radiation therapy and physical therapy.

Others would have individual lectures within the preclinical courses, especially physiology, designated to deal with the physics of the matter in hand. These would be given either by the appropriate physiologist if he had a strong leaning to the physical viewpoint or by a biophysicist. Yet again others believe the desired result may be attained, as regards the "biophysics of physiology" anyway, merely by the whole instructional staff making a determined effort to stimulate the students to a physical analysis of all phenomena they study.

The department of biophysics in undergraduate teaching

Any of the foregoing approaches can be implemented equally well by a department of biophysics or by one or more biophysicists in other departments. Basically the question of the need for a separate department is one of broad administrative policy. A multiplicity of small departments, in many ways costly and inefficient as compared with fewer large departments, has certain advantages in special circumstances. These advantages are more evident in the areas of postgraduate education, research and consultation within the college and depend somewhat on the size of the program for teaching and research training.

From a teaching standpoint, all biophysicists and men with strong physical leanings should have a focus point; whether they are hired primarily for research purposes, as teachers, or as hospital physicists. This focus may be a department of biophysics or a "research institute"

or "laboratory" of biophysics (the teaching function of the laboratory members being administered by various appropriate departments providing the teachers' salaries) or by a "division" within any department (most likely medicine, physical medicine, radiology or physiology), the members of the division having if necessary a dual appointment in another department. If the focus of biophysics is a division of a department of radiology or physical medicine care must be taken to be sure that the discipline of biophysics becomes neither too narrow in the former case nor too shallow in the latter.

Such a group, or focus should assume several functions in addition to the teaching in the medical curriculum. Teaching, both formal and informal in graduate or postgraduate and residency programs may be needed. Part of this can be integrated with the group's own research. Further, members of the group should be valuable in collaboration or consultation on biophysical aspects and techniques of research problems and in the development of new approaches in therapy. Consultation on instrumentation, also valuable, requires special consideration if the biophysicist is to avoid using all of his time as a repair man. One protection against this disaster is to provide the biophysics group with a well equipped electronics technician.

When professional consultation on instrumental matters so indicates, this technician, supervised by the consultant biophysicist can be hired out to the department or project requesting the service at a price designed to prevent swamping of the electronic technician's facilities.

***Definition*: DEFINITION—A way of making the intellectually color blind see red.**

El papel del Departamento de Biofísica en la Escuela de Medicina

Todo el mundo está de acuerdo en que el estudiante de Medicina necesita instrucción en Biofísica, por lo menos en tres materias: el uso de los instrumentos de Física (desde el simple martillo hasta la mágica caja electrónica); el conocimiento de las reacciones del cuerpo contra los agentes físicos, y la aplicación de las teorías físicas desde el punto de vista clínico. Pero, ¿es suficiente la instrucción en esas materias tal como se imparte actualmente? ¿Son los métodos de enseñanza adecuados y eficaces? Entre los que están convencidos de que la enseñanza biofísica fundamental en las Escuelas de Medicina requiere más atención de la que está recibiendo, hay considerables divergencias en cuanto a cómo podría remediarse esa deficiencia. Algunos son partidarios de que se enseñe un curso para estudiantes de primer año, de Física clásica, cuantitativa y de medición, y principios biofísicos básicos, que serviría como punto de referencia en todos los cursillos subsiguientes. Otros prefieren un cursillo de Biofísica simultáneo a otro de Fisiología, y ambos relacionados. También hay algunos que proponen conferencias individuales, dictadas dentro del marco de los cursos pre-clínicos, especialmente el de Fisiología, las cuales harían referencia a las implicaciones físicas de las materias tratadas en dichos cursos. Estas conferencias serían dictadas por fisiólogos con fuerte inclinación hacia el punto de vista físico, o por biofísicos. Finalmente, algunos creen que los resultados deseados podrían ser alcanzados, por lo menos en cuanto a la "Biofísica de la Fisiología", si todo el profesorado hiciese simplemente un esfuerzo por estimular a los estudiantes a hacer un análisis físico de todos los fenómenos que estudian. En vista de lo dicho se plantea, pues, la cuestión de si existe la necesidad de un Departamento especial de Biofísica en las Escuelas de Medicina, cuestión que es discutida en detalle en el presente artículo. El autor llega a la conclusión de que, si bien un tal Departamento separadono es absolutamente indispensable, su existencia presentaría, sin embargo, grandes ventajas, sobre todo para la instrucción e investigación en el nivel de los post-graduados.

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Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

Cardiovascular Teaching from the Pharmacologist's Point of View

F. E. SHIDEMAN

AT THE UNIVERSITY of Wisconsin there are numerous shortcomings in our present methods of teaching pharmacology including its cardiovascular aspects. Three formal lectures, approximately seven per cent of the total given in the course, are devoted to a consideration of cardiovascular agents. One period is reserved for discussion of the cardiac glycosides, and during the other two, the pharmacology of quinidine and related agents, the nitrites, the antihypertensive drugs and miscellaneous agents are presented. One full laboratory period of three hours is devoted to a demonstration of the principles of failure and its treatment in the heart-lung preparation. Although no further time is specifically allocated to cardiovascular teaching, drugs affecting this system are brought into focus in other laboratory experiments, in the lectures, and during weekly one hour discussion periods. The course, in general, follows the pattern of the time worn lecture-laboratory procedure common to the basic sciences—an organized series of lectures with laboratory experience in certain appropriate areas. Although originally designed to teach by experience the laboratory course, in most instances, has failed to achieve this goal. Cookbook experimentation has been the rule. The experience is completely inadequate, in no way resembling the stimulation and excitement so evident in those individuals working in the research laboratory. Much could be accomplished if we could bring this type of experience to the medical student. It is a fact, regardless of whether or not we wish to admit it, that a medical school is in many respects a trade school and that we are training men for a profession. The student must possess a certain minimum of factual material, but I believe we should try to produce more than a glorified I.B.M. machine into which are fed facts and from which is obtained a diagnosis and therapeutic regimen. (In my contacts with graduating medical students and general practitioners, this is too often the case.) I believe you will agree that it is essential to first provoke in the student an inquiring interest. Once this is realized cerebration must follow. The problem is "How to stimulate and provoke." There are almost as many answers as there are teachers, so the best I can do is to offer some of my own thoughts. The learning process requires active response on the part of the student. Dewey has pointed out that this response will depend in a large measure on the clarity with which he perceives the relationship of the new knowledge to his past experiences and to his goal for the future. In pharmacology this would involve the utilization of knowledge gained previously in physiology, biochemistry, anatomy, bacteriology and pathology with a view to providing a basis for rational therapeutics. At the preclinical level we could begin laying the foundation for a correlation of fundamental drug action and practical application. It is our plan to enlist the help of certain members of the clinical staff in this respect. Every two or three weeks during the weekly discussion periods,

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the pharmacological basis of therapeutic problems in the various clinical specialties will be discussed. The cases will be straightforward ones and picked so that the student will not be more confused than enlightened by the complexity of the situation. Such a program should be extended beyond the pharmacology course for the student to derive maximum benefit from it. We have made a step in this direction in the nature of a correlative course on the cardiovascular system. This has been presented to the senior students by Dr. Crumpton, Dr. Crosley, Dr. Youmans and myself. An attempt has been made to bring together some of the isolated facts garnered from physiology and pharmacology and present them in such a fashion that the clinical picture can be interpreted in a more basic and rational manner and a more logical approach to therapy can be provided.

The learning process may be further improved by seasoning our not too infrequently unpalatable lectures and tasteless, stereotyped laboratory exercises with a little of the spice of independent endeavor. The tendency at the present time is to proceed to the extreme; as exemplified by the radical experimental programs in some of our medical schools. Wouldn't it be much wiser to proceed in a manner similar to that which one employs in approaching an endpoint in a titrimetric procedure? To this end the project type of teaching could be gradually introduced, more being added as experience is gained. Such a course lies somewhere between the old formal discipline of a step-by-step advance under close supervision and the ultra-modern approach of learning entirely by experience. This would appear to be a somewhat more logical and feasible way of arriving at our goal than by suddenly and radically disrupting our present teaching method. We are all familiar with that old expression, "Experience is the best teacher," but in the current discussion on medical education we all too often lose sight of this truism. I am certain all of us have observed more than once in the field of medicine the swing of the pendulum from one extreme to the other before a stable, rational course has been followed. We, as educators, should profit by such past experiences.

El punto de vista del farmacólogo en la enseñanza de la Medicina cardiovascular

En este artículo, el Dr. F. E. Shideman, jefe del Departamento de Farmacología de la Universidad de Wisconsin, hace una crítica del curso de Farmacología (incluyendo la Farmacología cardiovascular) tal como se suele enseñar en esta Universidad, y presenta algunas sugerencias para su mejoramiento. El defecto fundamental de dicho curso consiste, según el autor, en que se sigue las viejas rutinas aplicadas comúnmente a la enseñanza de las ciencias básicas. Los experimentos de laboratorio son del tipo "receta de cocina" y en modo alguno pueden dar a los estudiantes el estímulo y excitación que reciben los que trabajan en un laboratorio de investigación. Aunque admite, desde luego, que el estudiante ha de poseer un cierto minimum de conocimientos factuales, el Dr. Shideman cree que lo esencial, en esa enseñanza, debe ser despertar en el estudiante el interés por la investigación. ¿Como se ha de "estimular y provocar" este interés? El proceso de aprender requiere, por parte del aprendiz, una respuesta activa, la cual, según Dewey, depende grandemente de la claridad con que éste perciba la relación entre un nuevo conocimiento y sus propias experiencias en el pasado, así como con sus fines en el futuro. Aplicado este principio a la Farmacología, esto implicaría la utilización de los conocimientos, adquiridos previamente, en Fisiología, Bioquímica, Anatomía, Bacteriología y Patología, todos los cuales han de constituir base para una terapéutica racional. Se podría comenzar creando la base para una correla-

ción de la acción fundamental de las drogas con su aplicación práctica. Para este fin recomienda el autor el valerse de la ayuda de algunos miembros del profesorado clínico que participarían en los períodos semanales de discusión, y en ellos se destacarían las bases farmacológicas de problemas terapéuticos. En la Universidad de Wisconsin se ha dado un paso en esta dirección con la introducción de un curso correlativo sobre el sistema cardiovascular, ofrecido a los estudiantes de cuarto año, en el cual se hace un esfuerzo por relacionar los datos aislados, recogidos de la Fisiología y la Farmacología, y presentarlos en tal forma que el cuadro clínico pueda ser interpretado más racional y lógicamente desde el punto de vista terapéutico. También se podría hacer más interesantes las clases, a menudo aburridas, así como los rutinarios ejercicios de laboratorio, si se estimula a los estudiantes a emprender algún trabajo independiente. Sin embargo, el autor pone en guardia contra la actual tendencia a seguir esa dirección hasta el extremo, como se ve en los programas demasiado radicales de experimentación que han sido introducidos en algunas Escuelas.

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Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

Psychiatric Participation in Undergraduate Cardiovascular Teaching

MORTON F. REISER

PSYCHIATRIC PARTICIPATION in cardiovascular teaching, being a quite young and only partially explored field, presents a relative abundance of unanswered questions and a relative scarcity of clear landmarks. This being the case it would seem wise to preface a brief discussion such as this by a statement of personal belief or bias regarding goals, process and responsibility in this area. This statement and the material to follow are based upon experience gained during a six year experimental program in teaching psychosomatic medicine. This was supported by the Commonwealth Fund and carried out jointly at the University of Cincinnati College of Medicine by the departments of medicine and psychiatry under the immediate direction of Dr. Eugene B. Ferris and Dr. Milton Rosenbaum.

The goals, as we see them, consist of preparing the students to deal with the personal emotional problems which both affect and grow out of the medical disorders presented by their patients. This involves (1) understanding of personality and psychologic function in health and disease; (2) acquaintance with and understanding of psychophysiology ie., the known mechanisms which mediate the effects of emotional stress upon physiologic systems; (3) awareness of what is not known in this area; (4) an ability to recognize and evaluate the emotional aspects of the patients' problems through proficiency in interviewing; (5) an understanding of the psychology of the doctor-patient relationship and finally, (6) a willingness to deal with these problems. This may be stated

Dr. Reiser is associate professor of psychiatry at the Albert Einstein College of Medicine.

another way, i.e., a reasonable lack of anxiety in the interpersonal aspects of the doctor-patient relationship.

The goal emphatically is *not* to make psychiatrists of the medical students, but rather to provide adequate preparation for practice at the nonspecialist level.

In the human approach to any emotionally charged topic there is serious danger of assuming an extreme position, i.e., uncritical overenthusiastic acceptance or uncritical phobic rejection and denial. Either of these extreme positions will clearly and seriously limit the effectiveness of the student in his later pursuit of medical practice. The task is to instill realistic *perspective* and *judgment* in the student so that he may place appropriate emphasis in his clinical work. For this reason we feel it most desirable that the internist and other nonpsychiatrists share in this obligation and play an integral active participant role, that a large part of the teaching be centered around actual case material, and that it be carried out through preceptor and small group techniques which provide for free discussion and close personal supervision of the students' growth and development in this area.

Psychiatric participation, specifically in cardiovascular teaching, may be considered under two general headings: (1) a very brief survey of content appropriate for presentation, (2) a review of promising teaching techniques and methods.

I. CONTENT:

Topics of particular pertinence to the cardiovascular area include:

A. The role of emotional stress in influencing the clinical course of established cardiovascular disorders e.g., precipitation of congestive failure in patients with structural heart disease and diminished cardiac reserve.

B. The problem of psychologic adjustment to the illness itself and the sequelae of inadequate adjustment as they may in turn affect the patient's course, response to treatment, and general life adjustment.

C. The possible contribution of physiologic factors to the precipitation and, perhaps in part, to the etiology of certain conditions e.g., essential hypertension and migraine.

D. The role of the doctor-patient relationship in the diagnostic and therapeutic phases of work with patients e.g., psychology of physical examinations, history taking, laboratory study, prescription of medication, check-up visits, etc.

E. Differential diagnosis of functional symptoms from those based on tissue damage or anomaly including consideration of the problem of iatrogenic cardiac complaints, cardiac neurosis, etc.

F. Delirium.

The separate departments involved, including the preclinical disciplines must provide the basic general principles and procedures. To this end it is obvious that the basic psychiatric material must be presented in the first two years as a prerequisite to understanding and dealing with the integrations proposed. The necessary background preparation is essential if such a combined approach is to be attempted in the clinical years.

II. METHODS

At this point I would like to take the literary prerogative of assuming that the necessary preparatory work has been most satisfactorily accomplished, and proceed for the moment to a consideration of techniques of integration in the clinical years. You

will be quite justified in interpreting this maneuver as a polite way of trying to disguise a headlong flight from grim reality. I promise to touch on it briefly before concluding.

It is preferable for these teaching activities to be carried out as part of the clerkship on the medical service itself, where these considerations may then fall into place as one of the several aspects of thorough medical practice. The more the competent internist himself contributes the more does the student accept this as part of clinical thinking.

The psychiatrist's role in the medical setting is a supplementary one, designed to broaden and enrich the student's experience and outlook. Specifically his efforts are continuously directed (1) at identifying the patient's problems and tensions, (2) at clarifying the psychodynamic and psychophysiologic mechanisms underlying the relationship between the emotional and physical aspects of the illness, and (3) at clarifying the psychodynamics of the patient's relationship to his doctor and pointing out ways in which management of this relationship may aid in the neutralization and amelioration of noxious life situations and influences.

We have found it most effective for the work to center about patients' problems and to proceed from the practical immediate considerations to the theoretical rather than the other way around. Initial attention is focused upon problems of diagnosis and management; for example, refusal to accept medication, inability to follow diets, reluctance to permit diagnostic procedures, undue prolongation of symptoms, etc. These problems lead naturally to considerations of the patient as a person and his problem in living. These then provide the platform for detailed consideration and review of the psychophysiologic mechanisms that may be involved in the clinical course, and even for discussion of theoretical etiologic aspects where they may be pertinent. They also provide background for understanding the doctor-patient interaction and its potential role in augmenting the effects of standard medical procedures and routines. It is also important that there be work with unselected cases so that the students see cases in which psychiatric inquiry does not reveal clinically relevant data, and so that they get some ideas of the frequency with which they can expect to encounter emotional stress as an important factor in general clinical practice.

Specifically three types of teaching exercises have been productively explored.

1. Comprehensive workup of individual patients under the immediate tutorial supervision of a psychiatric instructor. The value of doing things together as a teaching technique in this area cannot be too strongly emphasized. Such close individual work permits the student and instructor to observe each other's work and discuss techniques as well as findings most productively.

2. Formal case conferences and rounds which form the point of departure for detailed didactic discussion of psychophysiologic mechanisms pertinent to the case under study. Here the use of slides and other visual aids is of the greatest help. These conferences also serve to review the literature and discuss theory more formally.

3. Small group discussions led jointly by an instructor from medicine and an instructor from psychiatry. These we have held once a week with groups of 6-8 students. They provide for thorough talking

out of diverse practical and theoretical problems. In addition they expose the students to areas of limitation in both fields, and to areas of agreement and disagreement between them. Incidentally, it has been our experience that the discussion leaders have learned a great deal from the students and from each other in the process.

To return to the preclinical years, in conclusion, it seems clear that the principles underlying the clinical exercises described might well be expected to apply to the teaching of psychologic integration in the preclinical curriculum—particularly in conjunction with certain phases of the work in physiology, pharmacology, and preventive medicine. In the coming years we will have the opportunity to work intensively in this area at the newly established Albert Einstein College of Medicine in New York City. Here we hope to gather experiences regarding the value of placing selected and qualified psychiatrists as liaison instructors in the laboratory of physiology, and to draw upon instructors from the various preclinical disciplines for collaboration in the small group discussions and demonstrations that will be part of the basic preclinical psychiatric curriculum. Experience in this area is still quite limited, but, hopefully, more will be available in the future.

***Definition:* THE DEAN—A bird, egocentric, and cliche-using, self promoting, migratory, whose temporary habitat is a large office, air conditioned, near the front of the medical school, usually seen in black footwear, and blue suit, whose characteristic call is "toooo much."**

La Psiquiatría y la enseñanza de la Medicina cardiovascular para estudiantes no graduados

Los datos y sugerencias presentados en este artículo por el Dr. Morton F. Reiser se basan en sus experiencias, durante seis años, con el programa de enseñanza de Medicina psicosomática, proyecto subvencionado por el *Commonwealth Fund*, y llevado a cabo por el Departamento de Medicina y Psiquiatría de la Universidad de Cincinnati. El propósito de dicho programa, según señala el autor, enfáticamente, no es el de hacer psiquiatras de los estudiantes, sino el de darles una preparación adecuada para la práctica general. Esta preparación requiere 1) la comprensión de los factores psíquicos, tanto en salud como en enfermedad; 2) el conocimiento de los mecanismos que intervienen en los efectos de las presiones emotivas sobre el sistema fisiológico; 3) el reconocimiento de que hay elementos desconocidos en ese campo; 4) la habilidad de reconocer y evaluar los aspectos emotivos de los problemas de un paciente; 5) comprensión psicológica de la relación entre médico y paciente, y, 6) la voluntad de enfrentarse a tales problemas. Se considera deseable que instructores no psiquiatras participen en dicho programa. En cuanto a la participación de los psiquiatras en la enseñanza de Medicina cardiovascular, el autor señala las principales materias a tratar, como, por ejemplo: Los efectos de la presión emotiva sobre el curso que toman los trastornos cardiovasculares establecidos; el problema del ajuste psicológico a la enfermedad; el papel de la relación entre médico y paciente en la diagnosis y terapia de los trastornos cardiovasculares, etc. En dicha enseñanza, el psiquiatra tiene esencialmente el papel de un "clarificador" de problemas. Los métodos de enseñanza, descritos detalladamente en este artículo, consisten, en resumidas cuentas, en 1) el reconocimiento comprensivo de pacientes individuales bajo la supervisión directa de un psiquiatra (se hace hincapié en el gran valor didáctico que tiene tal cooperación inmediata entre estudiante y profesor); 2) seminarios sobre casos individuales, y visitas, los cuales constituyen los puntos de partida para discusiones detalladas sobre los mecanismos psico-fisiológicos pertinentes, a veces con ayuda de proyecciones; 3) discusiones, para grupos de 6-8 estudiantes, una vez por semana, dirigidas por un instructor de algún campo de la Medicina, y otro psiquiatra. El programa descrito ha sido designado para estudiantes en su fase clínica; los principios en que se basa podrían, sin embargo, aplicarse también dentro del *curriculum* pre-clínico, particularmente en unión de ciertas fases en los estudios de Fisiología, Farmacología y Medicina Preventiva.

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Cardiovascular Teaching from a Surgeon's Point of View

FRANK GLENN

IT IS MY PURPOSE to present the viewpoint of the surgeons and those with whom they work at The New York Hospital—Cornell Medical Center. Although we surgeons are relative newcomers in this field, we have in a few years gained some experience and considerable enthusiasm and interest in cardiovascular problems. The physicians and internists have been caring for patients with cardiovascular diseases for a long time. The surgeons it is true made some attempts to help patients with obvious lesions such as aneurysms but the results were discouraging. Valentine Mott over 100 years ago demonstrated that heroic measures could be employed with success, but they were infrequent and could be done by very few. Alexis Carrel perfected the technique of vascular anastomosis before 1920 and in 1925, Souttar of England did the first finger fracture of the mitral valve for stenosis. These accomplishments, brilliant as they were, received little recognition for 15 years. Then as a result of advancements in surgery in general and in other fields of medicine and in its basic components, pathology and physiology, the surgeons began a new attack on the abnormalities of the cardiovascular system. Robert Gross and his ligation of the patent ductus arteriosus is a typical example of a surgeon successfully accomplishing for the first time a new procedure and thereby opening a new approach to congenital cardiovascular lesions. This trend is increasing and surgeons are each year providing new and promising therapeutic procedures. The teaching of these developments to the medical student and those in training as a resident staff is our concern here.

The progress in the diagnosis and treatment of cardiovascular conditions and disease have been so rapid in the past 10 years that teachers and students have been taxed to know where to place proper emphasis. Indeed the surgeons are rapidly becoming more involved; they have been in the process of accumulating experience over the past 10 years, which is too short a time for sound precedents to become established. The problems of the internist and cardiologist have changed and they, like the surgeons, have turned to the cardiophysiologist and the angiocardiologist for assistance. In speaking for our surgical group at Cornell, I may say that we have had to learn from every one else as much as we could in order to catch up with our confreres in the matter of diagnosis. Likewise the internists and cardiologists are co-participants in surgical therapy to an extent not previously anticipated. Furthermore the hazards of surgical procedures upon the abnormal cardiovascular system has increased the demands placed upon all who participate in this endeavor.

From the very beginning of our present interest in cardiovascular problems when I assumed my present position at The New York Hospital—Cornell Medical Center in 1947, Dr. Harold Stewart, cardiologist, and I have worked in close association. We served as a nucleus encouraging

Dr. Glenn is professor and head of the department of surgery at the New York Hospital.

chiefly the internists to bring us their problem cases within a limited category. In a similar manner the pediatricians were most cooperative and helpful because they had been aware of the possibilities of correction of congenital lesions. We then enlisted the x-ray group and then shortly came Dr. Dotter and Dr. Steinberg with angiocardiography. This was a true advance. Somewhat later Dr. Daniel Lucas, cardiophysiologist, provided information gained with the use of a catheter tip placed at strategic points which did much to solve diagnostic problems and postulate what surgical therapy might best be attempted. Beyond diagnosis was the ever-present problem of how to provide surgical therapy for poor risk patients. It was quite obvious that surgery was dependent not as much on technique of operation as upon the anesthesia. So Dr. Joseph Artusio, anesthesiologist-in-charge, became one of our group. This in brief has been the evolution of a cardiovascular team at The New York Hospital—Cornell Medical Center over the past eight years. It is a working group. Each of us is learning from the application of our best efforts directed to patients who have come to us for diagnosis, evaluation and treatment. It now includes cardiologist, pediatrician, internist, cardiophysiologist, roentgenologist, angiocardiologist, pathologist, obstetrician, anesthetist and surgeon. Each has his say. All are active participants, capable and contributing. The responsibility for the various patients and the numerous segments of their management rests with the section from whence they come. Then once a week we meet as a group and together review the experience derived from these patients, discuss those relevant problems that perplex us, and truly there is no lack of them.

Dr. Stewart on another day conducts a teaching conference which we all attend and in addition the medical students, the house-staff and those members of the senior staff who may have an interest in this subject. At this session are presented selected patients that are discussed in such a manner as to emphasize the chief clinical manifestations of the more frequently encountered cardiovascular problems. Carefully selected cases, clearly and concisely presented followed by pertinent discussion are the basic and essential elements of instruction for the undergraduate and all others.

The activity, advancement and accomplishment of those working in the field of cardiovascular disease at present is unmatched by any similar pursuit in the past. Like any rapidly growing structure what it produces needs to be carefully evaluated before it is accepted or discarded. All of us are a part of this structure. I am very aware that those members of my immediate staff, both senior and junior, along with myself are all very much in the learning stage. As we learn we are eager and enthusiastic to teach and pass along onto others what information we have. Because changes are taking place so rapidly and we feel so new in this field, our inclination has been to enlist the interest of the students, house staff and senior staff in what we are currently doing, acquainting them first hand with our problems and ideas rather than attempting to provide them a "course of study" on surgical aspects of cardiovascular disease. The details of our working unit and the role of the various participants which includes all departments in the hospital tell only of a plan that fits our institution. What is accomplished, what is done, is the more important—and you who are

teachers know as I well do that if it be worthwhile interest readily is extended.

I do not believe that cardiovascular disease should be isolated and treated as an exclusive specialty. Indeed the subject is far too broad for that; it is intricately involved in all medicine. Much new information has been gained in the past few decades; much more will be forthcoming in the near future. The profession including its teachers and investigators are participants in the utilization of new developments. The didactic teaching of facts and procedures is futile. They are quite likely to be out of date before the instructor's voice echoes down the hall. Rather we need to teach what we are doing, namely learning about evaluating and solving the clinical problems of patients with cardiovascular lesions. Perhaps we best accomplish this by example and having those who wish to learn participate in our work.

To train a surgeon for cardiovascular work requires that he first be a surgeon well-grounded on a wide base of general surgery. The Halsted type of residency training with an opportunity to learn how to attack an investigative problem in the clinic or the laboratory will provide the surgeons who will be effectual in carrying out the surgical therapy for cardiovascular disease. The technical knowledge for procedures are easily attained by these young surgeons. Their greatest problems rest in learning how to obtain the maximum information and help from their professional associates and their realization that the surgeon is but one member of a team.

***Definition:* FOUR YEAR CURRICULUM PLUS ONE YEAR INTERNSHIP—A completely inadequate period of preparation to qualify a man for the practice of medicine, surgery and obstetrics.**

El punto de vista del cirujano en la enseñanza de la Medicina cardiovascular

Los cirujanos, aunque relativamente recién llegados al campo de la Medicina cardiovascular, han adquirido en pocos años interés considerable por los problemas relacionados con ese campo. En el presente artículo, el Dr. Frank Glenn, presenta una breve historia de las contribuciones de la Cirujía a la Medicina cardiovascular, y discute sus propias experiencias en el New York Hospital (del *Cornell Medical Center*) desde 1947, cuando comenzó a trabajar allí como cirujano. Los esfuerzos del autor, así como de sus colegas cirujanos, con la cooperación de los médicos de todas las ramas de Medicina, han sido dirigidos, en la enseñanza y en la práctica clínica, a combatir la opinión de que las enfermedades cardiovasculares han de ser tratadas como especialidad exclusiva, ya que se piensa que todas las ramas de la Medicina están intrincadamente implicadas en ellas. En las últimas décadas, se ha adquirido mucha información nueva sobre este particular, y aun más se adquirirá en el futuro, y toda la profesión médica, incluyendo profesores e investigadores, deben participar en la utilización de esos nuevos desarrollos. El autor cree que la mera enseñanza teórica de datos y procedimientos es un esfuerzo estéril, ya que éstos serán probablemente superados por nuevos descubrimientos antes de que el instructor termine su curso. "Hay que enseñar," dice el autor, "lo que estamos haciendo, es decir, hay que aprender a evaluar y resolver los problemas clínicos de los pacientes con lesiones cardiovasculares". Preparar a un cirujano para ese campo, requiere, desde luego, que éste tenga ya una base sólida en Cirujía general. El llamado método "Halsted", de residencia en hospital, que enseña a abordar problemas de investigación en la clínica o el laboratorio, es muy adecuado para la preparación de cirujanos en el campo de la terapia quirúrgica de enfermedades cardiovasculares. Los jóvenes cirujanos adquieren fácilmente los necesarios conocimientos técnicos. Su problema mayor, por otra parte, consiste en aprender a obtener la máxima ayuda e información de sus colegas no cirujanos, y en advertir claramente que el cirujano no es sino miembro de un equipo.

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Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

Learning Auscultation

GEORGE DAVID GECKELER

WHOEVER WAS RESPONSIBLE for this title made a wise choice, for "learning" carries quite a different connotation from "teaching." It probably would not be disputed that the learning process requires active participation on the part of a student, and that the aim of teaching is to make a student think. Furthermore, because the enthusiasm of the instructor stimulates the desire of a student to develop such an *art* as auscultation, only teachers of the highest order should be used in this field. Time may well be spent in teaching a student how to listen, for such a complex subject requires students to understand that they must discipline themselves as they would to learn the technique of any other art.

If the subject is properly presented, beginners become interested in the features of sound itself, and this interest should be encouraged. For this purpose tape recordings are very convenient; by first playing a short run of music one may gain attention, and stopping this abruptly play different vibration frequencies starting at 50 cycles per second and going by increments up to 10,000 cycles per second. This is well followed by frequencies in the inaudible part of the spectrum using illustrations above 15,000 cycles per second and below 20 cycles per second. If they are available, models of the frequencies which make up heart sounds and murmurs may be used to demonstrate the complexity of these sounds. The length of time that a sound lasts and its intensity (which should be distinguished from loudness) are much easier to grasp. Then in order to drive home the fact that these same three features of all heart sounds must be analyzed to comprehend adequately auscultatory findings, and that one must listen "hard," music again may be played as background, gradually drowning out the instructor's voice. With this the student usually grasps the fact that distracting noises play a very important part when one is carefully listening, that often he must close his eyes to hear better, and that he must learn to discriminate between auscultatory findings and artifacts. He also learns that it is impossible to gain a proper understanding of this art by putting a stethoscope over different parts of the chest wall and simply listening, and that it is necessary to follow a set pattern of examination, and to train himself to listen specifically for just one thing at a time. Disturbances of rhythm, heart sounds, murmurs and adventitious sounds should be appraised not one with the other, but as separate entities; then these data are brought together in an orderly fashion and evaluated.

At the present time much consideration is being given to the value of "gadgets," or as they more appropriately might be called, auxiliary aids. Neither visual nor auditory aids are of much value in themselves, and can only help as they are integrated and used to implement clinical material. Some dissatisfaction with complicated electronic apparatus is becoming apparent, particularly in smaller centers where there may be

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poor facilities for servicing it. However, with simple aids there are great advantages, and many agree that with them it is possible to teach the student more adequately, and that their use not only benefits those who are instructed but stimulates and makes better teachers. To depend upon these aids, however, or to substitute them for actual experience of making an examination with a stethoscope is certainly unwise. It is also very important that the instructor who has become proficient in their use should not expect a novice to appreciate complex or bizarre patterns. The value of listening to heart sounds and simultaneously looking at an oscilloscopic trace of them is questionable, and it has been proven that such technique must be at the expense of either the visual sense or the auditory sense, and always requires that one learn to do two things at one time. Unfortunately an oscilloscope trace made with a microphone or tape recording of an auscultatory phenomenon does not show just what one hears with a stethoscope; this is understandable because with a microphone and amplifier which respond to low frequencies of heart sounds the inaudible part of the spectrum becomes visible but, of course, can not be heard. This may confuse a student because he will never hear it as he sees it. There is also a danger that the instructor may unconsciously be trying to demonstrate not an interesting phenomenon, but how erudite he has become.

There are a number of ways to help a student learn the art of listening more quickly and more completely. With a good amplifier and playback, using either earphones or a loud speaker in an acousticized room, a microphone may be placed anywhere on the chest wall and fairly large groups be taught. This is probably a tenfold better use of the time allotted in a curriculum for teaching auscultation to a beginner than the orthodox method of person to person demonstration. By recording these auscultatory phenomena one may build up a library and use illustrations to answer questions rather than trying to describe in words to a student some features he does not understand. This method also offers to students an opportunity to listen for as long as they desire without tiring the patient, for by simply splicing together the ends of a piece of recording tape an endless loop can be made and this can be played indefinitely. Furthermore, by splicing blank tape between sounds and murmurs the rate of the illustration may be reduced and the student able to hear for the first time that which he may have struggled with for years. Hearing this illustration once is is worth more than any verbal description or seeing it as a phenomenon on an oscilloscope trace, for on the next occasion he knows where to listen for it and the experience of hearing it just once is invaluable. This same method of splicing blank tape between sounds and murmurs may be used to separate them from each other and make it possible to listen to them as separate entities. If two reproducing units are available, it is a great help to tie in both of them with one amplifier-speaker unit and to play back quickly and compare one illustration to another. This is valuable in having the student learn the difference between a normal third heart sound and the lilt of a gallop rhythm, or the difference between an opening snap and a reduplicated pulmonic second sound. If desired, reels may be developed with commentary interposed between illustrations, and these may be used for practice and self-training. If a

room can be set aside for this purpose and is available at all times, a student may clarify some feature which is not clear to him, so that instead of discussing it with an instructor or reading a description of it he may hear it as long as necessary to gain a proper understanding of it. Often if there is available such material a student inadvertently comes across other illustrations, and as one finds when referring to a dictionary for the definition of a word, he learns more than he anticipated.

Visualization of auscultatory phenomena by phonocardiograms or an oscilloscope trace may be of value on occasion if used as an isolated demonstration, but one should avoid the spectacular and have as his only purpose helping a student to understand that he must discipline himself to learn to use a stethoscope, and that nothing else at this time can take its place.

In conclusion, it should be stressed that auscultation is an art, the technique of which must be learned just as one would learn to play a violin; that one must learn how to listen and to listen for just one thing at a time; that auxiliary aids give a student the opportunity to hear all types of abnormalities and are worthwhile if judiciously used; and that these auxiliary aids not only help the student, but make for better utilization of time alloted for teaching the beginner, and stimulate and help the instructor learn more about auscultation.

El aprendizaje de la auscultación

La auscultación, según señala el Dr. G. D. Geckeler en este artículo, puede en cierto modo ser considerada como un arte que tiene mucho en común con la música y con los sonidos en general, y cuya técnica se ha de aprender lo mismo que se aprendería a tocar el violín. Es de importancia primordial que los estudiantes aprendan primero a "escuchar", y, escuchando, a concentrar su atención en un sonido determinado con exclusión de todos los demas. Para ello recomienda el uso de aparatos auditivos simples cuya aplicación y utilidad describe detalladamente. También atribuye cierto valor, aunque mucho más limitado, a los fonocardiogramas o los osciloscopios, que se usan para visualizar los sonidos, pero siempre que se trate de evitar lo "espectacular" y que no se pierda de vista el propósito principal, que es enseñar al estudiante la disciplina necesaria para usar el estetóscopo, que hasta ahora resulta insustituíble.

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Separatas de este artículo, en español, podrán obtenerse si son soliciatadas por un minimum de 25 lectores.

The Uses of Models, Films, and Other Audiovisual Aids in the Teaching of Cardiology

ALDO A. LUISADA

TEACHING AND LEARNING, since the origin of mankind, have centered on the verbal transmission of acquired knowledge. Limited learning from "books" started after the invention of the alphabet, but extensive writing and reading was not possible until printing became common. Thus, while in the ancient times learning was based on lessons and seminars, an important visual aid has been added to the teaching of medicine since the 15th century: *the printed book.*

Teachers of medicine have used many aids in the past two centuries including *cadavers, anatomical specimens, wooden or wax models* and *color drawings* for the teaching of anatomy and pathology while *patients* were of primary importance in the teaching of clinical disciplines.

Modern techniques have developed two types of memory among students: (1) books, movies and television have developed visual memory; (2) lessons, conversations and the radio programs have developed auditory memory.

Good, integrated teaching should appeal to and make use of both types of memory, not only in order to exploit all possible avenues of contact with the student's mind, but also because different students may have greater development of either the one or the other type of memory.

(1) The patient as a visual aid:

The patient is still one of the most important tools in the teaching of medicine: (a) because of the emo-

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tional interest which the patient creates in the student; (b) because of the possible existence of signs to be understood and remembered; and (c) because of the development of associations between the words of the teacher and something (or somebody) to be remembered. In such respect, the patient it not only the objective basis of a clinical lecture, but also a stage "prop" of the greatest importance.

(2) Other "old-fashioned" aids

Other, well-known, aids are the *experimental animals*. Apart from better understanding of operative techniques, emotional impact and mnemonic value are connected with animal experimentation. No description can be substituted for the observation of the beating heart, the pulsating arteries, or the expanding lungs. The same can be said for *corpses* and *pathological specimens*, whose value for teaching is far greater than their demonstration value.

Laboratory specimens (urine, stool, sputum, etc.) may also fall in this group of aids. While the patient may supply tactile associations (thrill, temperature, rough skin, etc.), the specimens create olfactory associations (gustatory associations have been abolished since the development of chemistry of the urine). *Laboratory chemistry* is important, not only because it helps in understanding the chemical mechanisms, but also because the various colors and smells of chemical reactions will be helpful in creating mental associations.

(3) Elementary visual aids

Two elementary aids have been used for a long time in lecture rooms: *roll-up charts* and *the blackboard*. While the former are mostly used by teachers with no artistic inclination, the latter is especially used by those who are able to support, explain or even create a concept by a few quick strokes of the chalk. The utility of the blackboard cannot be over-emphasized. The sketches should be made *during* the lecture, not before, and they help in maintaining alive the attention of the class.

Other elementary aids are the *lantern slides*. While they may be used for any conceivable topic and purpose, unfortunately they are frequently employed as *a visual aid to the teacher* and not to the student. This may be one of the causes of the frequent naps which are taken by the class as soon as the room is darkened in order to project the slides.

(4) The use of models

Models are useful in the study of the anatomy and embryology of the heart and vessels, in the understanding of congenital malformations, and in the teaching of cardiac roentgenology. The biggest heart model has been prepared by the Chicago Heart Association and is visible at the Museum of Science and Industry: visitors actually walk inside this heart model!

Several models, prepared by the American Heart Association are in common use: the projection of their shadow on a screen is also useful for localizing the various structures in the oblique positions. More complex models may be used for the localization of the chest electrodes (papier maché manikins), for demonstration of the ECG vectors, and for the explanation of the vectorcardiographic loop.

(5) The fluoroscope and the x-ray films

Both fluoroscopy and the examination of films have great utility in the training of students. Fluoroscopy represents a necessary complement of physical examination and should be currently employed in the cardiac clinics, while films can be used both in the clinics and in more formal lectures.

(6) Moving pictures

Moving pictures may stimulate the interest of the students and help them to remember special techniques. It is the experience of the writer, however, that they cannot be substituted for regular lectures and that, if too long, they have a distracting influence or, at least, consume time without equivalent teaching value. Two suggestions may be given: (a) Short films, lasting from 5 to 10 minutes, may be projected during a lecture with good results. Surgical or medical techniques can be briefly explained in such a way. (b) Longer films including restful scenes may be projected either at lunch time or in the evening. The latter, however, should not be tried in large centers where commuting is time consuming and exhausting.

(7) Teaching electrocardiography

Only elementary electrocardiography should be taught undergraduate students who may become general practitioners or specialize in fields different from internal medicine. The writer gives a brief introductory course to junior students trying to get them to understand the basic patterns. Senior students will then try to interpret clinical tracings with the help of instructors and, if they wish, receive further training in the senior year.

Teaching of electrocardiography may be made easier by the use of: (a) heart models; (b) a manikin; (c) charts with sketches of the main patterns; (d) observation of actual electrocardiograms "in the making" by watching either a direct-writing electrocardiograph or an oscilloscope (see below); and (e) reading of tracings or comments on their reproduction in slides.

(8) Learning of auscultation

Auscultation should be learned chiefly by repeated listening to the hearts of clinical cases. As training of the ear and proper examination of different, typical cases undoubtedly takes several years, a complete training cannot be expected within a short time. On the other hand, several aids may accelerate the process. They are:

(a) Painstaking instruction by teachers who possess a good theoretical and practical background.

(b) Auscultation of patients by means of electronic stethoscopes. *Collective auscultation* has the advantage of reducing the time necessary for examination of a single case and that of graded amplification which often emphasizes low-pitched sounds and murmurs rendering their perception easier.

(c) Listening to sounds and murmurs from *tapes*. Tape recording and reproduction by loudspeakers or audiophones makes available at any time the best and most typical cases and avoids extraneous noises (including feedback). It further permits changes in the speed of the apparatus resulting in a spread of the sounds and murmurs which permits their "dissection" and analysis.

(d) Observation of the vibrations of sounds and murmurs on an *oscilloscope*. If this is done during auscultation, a double imprint (visual and auditory) is made on the memory of the student. This is particularly useful in individuals with a visual memory.

Electronic auscultation (or tape recording) and visual observation have been combined in special apparatus for teaching. Apart from their expense and the need for accurate technical maintenance and handling, they may have the disadvantage of distracting the attention of the class. For this reason, the writer believes that they may have their part in teaching small groups of not more than 10 students and that they should be used as tools for demonstration, while the main training should still be made on patients. Small schools with poor supply of patients may have to rely more on the use of tapes.

(9) Phonocardiography in the teaching of auscultation

Phonocardiography is a new method of investigation whose importance is more and more appreciated. The greatest value of phonocardiography lies in the fact that continuous correlation between bedside auscultation and phonocardiographic data increases the knowledge of the teachers in the field of auscultation and makes them aware of the many limitations and multiple pitfalls of this clinical method: in other words, it *creates better teachers*.

The use of oscilloscopes for demonstration of heart murmurs presupposes extensive knowledge of phonocardiography in the teacher and at least a minimum of knowledge among the pupils. Otherwise, no advantage would be gained by the use of these aids and no auditory-visual correlation could be reached.

In our school, elementary knowledge of phonocardiography is gained in the first two years because lectures of physiology on heart sounds and lectures of medicine on heart murmurs are accompanined by presentation of phonocardiographic schemes. In other words, the students learn that a murmur sounds "this way" because it is made of vibrations which look "that way." Clinical teaching may take it from here and no difficulty is encountered in reference to phonocardiographic schemes during the presentation of clinical cases to senior students.

Looking ahead

It is likely that the texture and modality of the "lectures" will be

thoroughly transformed in the future. In particular, the developments of television may cause revolutionary changes in the methods of teaching. Among the various possibilities to consider, that of lectures given simultaneously to many or all schools by renowned teachers, should be taken into consideration.

Television enables the students to see the details of surgical procedures much better than if they were present. This fact alone should advise further extension of this visual aid for teaching cardiology. The application of television to the various techniques of endoscopy may also be forecast. Tridimensional projection (or materialization) may become a possibility. Then, rare cases will be presented to students all over the country with great advantage for learning.

Conclusion

In conclusion, many audiovisual aids can be employed in the teaching of cardiology ranging from the blackboard to the oscilloscope and from the slides to the patient. These aids stimulate the interest of the students and help them in learning important details. Selection of the various aids depends upon financial resources of the school, number of teachers, wealth of clinical material, etc. It should not be forgotten, however, that the various aids are simple tools in the hands of the teachers and that an enthusiastic and able teacher is more important than any "prop" in his hands.

Definition: **AUDIOVISUAL AIDS—Devices to improve sight but not insight, the senses but not sense.**

El uso de medios audio-visuales en la enseñanza de la Cardiologia

Las técnicas modernas han desarrollado entre los estudiantes dos tipos de memoria: la visual y la auditiva. Una educación médica buena, integrada, ha de valerse de ambos tipos, utilizando los medios audio-visuales, desde los más elementales (que se conocen desde hace muchos siglos), como modelos de cera o madera, dibujos en color, animales, etc., hasta los modernos aparatos de radiografía y electrografía. (El autor destaca, sin embargo, que, en la enseñanza de las disciplinas clínicas, el paciente sigue siendo aun el medio "visual" más importante, y el mejor). En cuanto a la enseñanza de la Cardiologia, hay muchos medios audiovisuales para estimular el interés de los estudiantes y ayudarles a aprender detalles importantes. Se discuten en este artículo varios de éstos, desde la pizarra, los mapas y los discos, hasta el fluoroscopio, osciloscopio y los electro y fonocardiogramas. Es probable, concluye el autor, que todos esos medios técnicos transformen pronto, radicalmente, el carácter de las clases y conferencias, y los métodos de enseñanza en general. La introducción de la televisión en la enseñanza universitaria, sobre todo, ha de producir pronto cambios revolucionarios. La selección de los medios audio-visuales depende, en gran medida, de los recursos financieros de una Escuela. No hay que olvidar, sin embargo, que esos medios técnicos no son sino instrumentos auxiliares en manos del maestro, y que un instructor capaz y profundamente interesado en la materia que enseña, es más valioso que el "aparato" más perfeccionado.

Teaching Preclinical Subjects in Clinical Years

WILLIAM A. SODEMAN

SHOULD PRECLINICAL SUBJECTS be taught in the clinical years? The answer to this question is an unqualified yes. The medical student has spent the major part of his first two years extending his basic knowledge of biology, chemistry, and physics with application to normal and abnormal changes in the human being. During this time he has been introduced to abnormal changes in the human body by direct gross and microscopic examination of human tissues and fluids. He has learned something of the techniques of the detection of disease in the intact human being. By the time he reaches the junior or what is considered the first clinical year, he has been introduced to the methods and approach he will use in the investigation of diseased states in the intact body as well as the evidences and manifestations of factors contributing to deterioration of health. His understanding is based upon his awareness of disturbances in anatomy and physiology, including biochemical and biophysical aspects.

Clinical instruction therefore is but a further application of the knowledge gained in the basic sciences, designed to develop in the student an understanding of symptoms and signs, diagnostic criteria, and the why and wherefore of therapy. Without emphasis on basic science, the student is able only to recognize findings without adequate understanding and to memorize criteria for diagnosis and therapy. He learns to treat symptoms and signs without knowing why. Basic sciences are the essence of clinical medicine. Every clinical teacher worth his salt applies basic sciences and must therefore teach the preclinical subjects in developing his clinical approach. To be sure, the clinical instructor usually makes an assumption that basic principles have been taught and he may not repeat them any more than does the physiologist or biochemist in referring to the fundamentals the student learned in college biology or chemistry. If the clinical problem goes back to a basic point, basic knowledge is often reviewed. In this way "basic science" is continually touched upon to varying degrees in clinical teaching. However, the extent and depth to which basic principles enter into clinical discussions depend upon the training, activities and interests of the instructor and the bedside time available to him. These variables indicate the need for an aggressive program to assure adequate coverage of basic science material.

Occasionally the able clinical teacher will do an adequate job alone but usually the student will profit from the participation of the basic scientist himself. On the question of how he should participate there is great diversity of opinion. Should there be separately organized courses, integration of present courses or electives? In institutions where elective courses are given in the clinical years, preclinical teachers may offer courses which provide for the student's desire and need to have more background material. Such attempts

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have been made by offering electives in biochemistry as it relates to nutrition, in endocrine physiology as it relates to endocrine disease, in anatomical relationships of certain special surgical fields, and so forth. Here the basic science teacher may carry the chief responsibility for the course or give it entirely separately. Joint or clinical responsibility may be desirable, however, to assure an adequate orientation toward clinical medicine. Examples of this type of technique are found in clinical physiologic-biochemical or therapeutic conferences where clinicians are responsible for material and prearranged discussions are developed to fit the clinical situation.

Clinicians interested in physiologic aspects of certain phases of disease, such as those directing and participating in cardiac catheterization laboratory activities and special pulmonary function tests, may be thought of as "straddlers." They have in part preclinical as well as clinical interests. Many are old research fellows of preclinical departments who have returned to clinical medicine as clinical investigators. They have a deep interest in certain phases of the pure basic science as well as clinical application, diagnosis and therapy. Such individuals are ideal to teach certain aspects of preclinical subjects in the clinical years. They are usually highly specialized in a narrow field and are most effective only in that area. In a school in which a number of such individuals are available in varying fields, such as hematology, cardiac physiology, pulmonary function, metabolism and endocrine disease, and are active, much can be done with the basic clinical teaching staff alone. In the field under present discussion, cardiovascular teaching, individuals of this type are available in a high percentage of our school. Thus, clinical physiologic research, and the special laboratory structures set up for these purposes, serve as important tools in the teaching of the preclinical subjects in the clinical years.

In some schools, especially in which full time teachers are few in number, clinical teaching is done in large part by private practitioners. Under these circumstances, and even when the straddlers mentioned above are available, participation of preclinical staff in the teaching in the clinical years is highly desirable. The way in which this may be carried out varies greatly with local circumstances. Since the general tendency is away from organized lecture in the clinical years, formal basic science courses in the third and fourth years are often frowned upon. At times, physical separation of the preclinical departments and the hospital may make it difficult for the preclinical teacher to be available. He may spend an hour or more in travel to add 15 minutes to an integrated discussion. When such individuals go on organized ward rounds sometimes they may have to spend an hour or an hour and one half in order to contribute only two or three five-minute remarks. They see much waste motion in this kind of presentation. In panel discussions, and correlation clinics, where previous organization has given some approach to the integrated discussion, such individuals very likely can make an optimal contribution with minimal time involved. Participation in these discussions depends to such a great degree upon the background of the basic science teacher, the extent of his interests and the spirit with which he enters into the discussion that it is difficult to generalize on the worth of such procedures.

Depending upon local variations in

staff interests and coverage, many approaches may be taken, as already stated, from integrated discussion in ward rounds, special conferences and panel discussions to elective courses. In some institutions, where interest in the cardiovascular field is high in the department of physiology, weekly conferences, planned and focussed about certain problems with patients have been given as integrated discussions or as panels. In one school, weekly conferences are held by students who choose a faculty preceptor and pick their own topics. Later there follows a counter discussion by faculty members. It is most important that by some suitable technique in a particular institution the individual having the fundamental knowledge of the preclinical subject be brought in and that his discussion continue to revolve around the problem as it relates to basic science. In some institutions where biochemistry and bacteriology have a service responsibility in the hospital these departments are brought in with considerable ease, and correlation clinics are regularly scheduled for these purposes. At times, the basic science teacher who does not have a past clinical experience, especially those who are Ph.D.'s, have some reluctance to being exposed to patients and to discussions of patients. This factor must be evaluated individually.

The preclinical teacher often enters into correlated exercises of a horizontal type, that is, with his colleagues in other basic sciences. If he enters into a vertical correlation with the clinical groups there must be assurance that he is not spreading his activities too far for the job and personnel available. If the basic science faculty is large enough to provide coverage in several specialties (for example, a department of physiology having individuals basically concerned with neurophysiology, cardiovascular physiology, endocrine function and gastrointestinal physiology) the job can be done readily, but in smaller schools often only two or three individuals are available in one or two of these special fields. However with the help of the "straddler" mentioned above, it may be possible to make out a well rounded program.

Obviously the methods and attack must be based upon a program adaptable to the local situation. Geography, personalities, interests, character of clinical teaching and many other factors make the problem entirely different in one institution from that in another. The interest and will to cooperate in teaching are essential. The author's experience includes situations in which correlated teaching has sprung from correlated research. Here the men involved learn to know each other intimately; they know the likes and dislikes, strong and weak points, views and ideas of each other. They are better able to join together in teaching.

The effect of the participation of the preclinical teacher in the teaching in clinical years is, of course, our immediate concern. Such clinical exposure also has a secondary effect upon basic science teaching. When the basic science teacher is exposed to the clinical experiences mentioned above he renews his interest in and receives orientation in those phases of the teaching of his own basic science course which relate to clinical medicine. Since he is primarily concerned with the teaching of students whose aims are clinical practice, such exposure may have a beneficial effect in reorientation of the basic science course itself.

In summary, it seems practical and wise to foster the teaching of preclinical subjects in the clinical years. When most of this basic science is taught by clinicians it is likely to be inadequate, although many clinical investigators are adequately trained for and do an excellent job in this. The basic science teacher may contribute much to the clinical program and he should be stimulated to carry on his teaching in the clinical years.

Definition: **THE PSYCHIATRIST—The odd treating the id.**

La enseñanza de materias pre-clínicas durante los años clínicos

El autor contesta con un sí rotundo a la cuestión de si materias pre-clínicas deberían o no formar parte del *curriculum* del período clínico. Como las ciencias básicas son la esencia de la Medicina clínica, y la instrucción clínica no es, en el fondo, sino una aplicación de los conocimientos adquiridos a través de las ciencias básicas, el estudiante, sin la ayuda de éstas, solo sería capaz de establecer datos y aprender de memoria los criterios de diagnosis y terapia, sin comprenderlos verdaderamente. Todo instructor capaz ha de aplicar continuamente las ciencias básicas y, por tanto, tiene que enseñar materias pre-clínicas al abordar y desarrollar las clínicas. Aunque a veces el profesor de Medicina clínica es capaz de llevar a cabo por sí solo esta tarea, los estudiantes, por lo general, sacarán más provecho cuando participa en ella un profesor de ciencias. Hay, sin embargo, divergencia de opinión en lo que se refiere a los métodos de llevar a cabo tal participación. ¿Debe haber cursos especialmente organizados, o una integración de cursos ya existentes? ¿Deberían los respectivos cursos ser obligatorios o electivos? En este artículo se discuten varios aspectos de cada una de esas posibilidades. En cuanto al problema central, se llega a la conclusión de que parece cuerdo y práctico introducir y enseñar algunos cursos sobre materias preclínicas en el período clínico.

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Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

Research as a Teaching Tool

ARTHUR C. GUYTON

THOUGH ALMOST ALL full-time medical teachers are now expected to conduct research programs as part of their school commitments, the question is often asked, especially by clinicians: Can a teacher devote much time to research and still do a good job as a teacher? The counter question is then proposed, Can one be a competent teacher without performing research? The answers to these two questions will never be clear-cut, but the arguments which I have heard around my own medical school and other medical schools, at two conferences on cardiovascular teaching, and at still another conference on basic science teaching have all been embellished with many defi-

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nitions of the research worker such as:

(1) The practicing physician's definition of a research man as a theoretical genius necessary for ornamentation to the shrine of knowledge but one who is totally impractical and is best secluded from the students so that he will not contaminate their minds with heresies to the mass of ordained clinical knowledge—knowledge that is inviolate, immaculate, and composed of self-truths by virtue of having been taught for at least three decades.

(2) The dean's definition of a research man as that bore who demands less teaching load, more research opportunity, higher pay—though well resisted on this point—and, sin of all sins, less committee work; all of these demands making the research worker an intolerable person, which in turn makes the dean lead an intolerable life in an intolerable situation, for unfortunately it is the research man who glorifies the institution to granting agencies and thereby makes it possible for the dean to quote each year gains in staff, in operating budget, in papers published, and patients buried, all of this allowing him to perpetuate his air-conditioned though tenuous sanctum for at least another year.

(3) The clinical investigator's definition of a research worker as one who has had five years of postgraduate training in internal medicine—for what other specialty could possibly qualify one for research—one who impresses the students with his great wealth of knowledge about basic fundamentals; who nevertheless supports his wife in the handsome manner to which she has been accustomed, this accomplished by seeing a few consultation patients who do not require more than 10/11 of the week; and, yet, who promotes earth-shattering research through pearls dropped in occasional chats with his laboratory minions who preferably include at least three full-fledged and fully-trained basic scientists attracted from the preclinical years of medicine into ghost-research positions, protected, brain-washed, and brain-picked, yet watering at the mouth for more crumbs which might keep them alive until next pay day.

(4) The basic scientist's definition of a research man as that glorious human being who has divorced himself so completely from life that he no longer needs physical sustenance, existing as he does on intellectual accomplishment which is expressed in degrees of abstraction proportional to the importance of the research, the ultimate goal being a depth beyond the ken of all contemporaries but nevertheless impressive enough to worm its way out of the earth a million years hence, immortalizing the memory of the originator in the minds of the super-race of tomorrow.

(5) Finally, the student's definition of a research man as that hopeless individual, lost in a state of depression, irritated by the smell of a student at 100 paces, capable of total destruction of student morale, and deigning to speak to a student only when he is searching for a neuronal cell that might perchance be fertilized and spawned into a new research worker, thereby depleting the rank of the students by one, leading to a fate worse than death.

Mind you, these are not my own definitions of a research worker, for I and my conscience will confess only to each other my own beliefs. Yet, to begin a serious discussion of the importance of medical research as a teaching tool, let us list some of the

trite truths which all of us can perceive concerning the relationship of research to medical teaching:

Research undoubtedly increases the teacher's fund of specific knowledge in a specific field, which may be good if this great fund of knowledge is used judiciously for authoritatively coaching the student toward higher goals in medicine. Yet, such a specific fund of knowledge can also lead the teacher into false emphasis of detailed data totally irrelevant to the training of a medical student and often even impossible to understand. This unfortunately is the medical student's major criticism of the research-minded professor.

Many types of research work fortunately lead to an attitude of logical thinking and critical judgment on the part of the teacher, and these attitudes then are exemplified to the student, bringing forth in him the medical scientist as opposed to the medical tradesman. Yet, it is a false concept to believe that all research work creates these attitudes, for some types of research work are nothing more than hit-or-miss trials conceived on the basis of prejudice rather than on the basis of logic and adequate study. This type of research is far too prevalent, and it has been fostered by the concept that each medical teacher must be a research worker whether his background, training, ideas, and personality are geared to research work or not. In the pursuit of this program he wishes to gain for himself a higher berth in the hierarchy of his school rather than to push back the frontiers of medicine.

Even those of us who believe that research work is an essential and necessary part of every medical school must still admit that some excellent medical teachers have a total lack of interest in research work. Many medical teachers who engage in research work insist that such a superb medical teacher who yet is totally removed from research work is so rare that the probability of his existence is close to zero. Yet, each teacher who does not engage in research work probably assures himself that he belongs in this group. Then there is the other type of teacher who is not engaged necessarily in medical research but nevertheless is engaged in positive efforts to improve his teaching methods, which in itself is a type of research and adds perhaps more than we know to the over-all success of medical schools.

Almost all medical schools in America use at least some students as participants in active research programs. Also, a few medical schools actually assign minor research projects to all students, and other medical schools would like to institute such student participation programs but have neither the facilities nor teaching time available to do so. On the other hand, a few medical schools have tried compulsory student participation in actual research work to the displeasure of both the students and the teachers, leading eventually to recession from the program. Thus, the concensus of opinion of participants in the teaching institutes which I have attended has been that student participation in research work on a voluntary basis, conducted mainly in the summer, is an excellent procedure, stimulating to the student and teacher alike and often leading to the recruitment of new research workers. On the other hand, compulsory student participation in research work is likely to require too much of the student's time, too much of the teacher's time, and too much school expense, and it is likely to be rewarded by too

few benefits due to the lack of interest on the part of the student or the teacher or both. Yet, a type of research work which can be compulsory and which is usually liked by the student and also beneficial to him is a research project conducted solely in the library, beginning with an introduction to library technique and culminating in a search of the literature relating to a specific field of interest.

Now, may I change the tone of this presentation and simply admit that we will never answer all of the questions raised by the above thoughts and also admit that each school is a different entity characterized by its own problems which are irrelevant to other schools. Yet we can call upon historical statistics and make our point for research work as a teaching tool without necessarily explaining why research work makes a better school. Throughout the ages of medicine that school which has led in research has also led in attracting the better students and has led in the production of medical teachers and medical doctors capable of the latest and best practice of medicine. This principle that research is the basic fountain of medical knowledge and training actually began with the days of Hippocrates and has spread through the times of Galen, Vesalius, Lister, Pasteur, Halstead, Osler, Cushing and others on down to our present day. At the turn of the century, only a few medical schools in America were renowned for their research, and it was the graduates of these schools who became the leaders in medicine throughout America even though only a small fraction of the total number of physicians were educated in these schools. Perhaps the modern trend toward more and more research in medical schools is an attempt to emulate these forerunners of American medical leadership, but here I would like to ask: Is it wrong for all the other schools of America to emulate such an example? Are we in error in our belief that something about research work in a medical school makes the school more worthwhile for the student? Are we wrong in believing that in some inexplicable way the scholarship associated with research work exudes into the student and makes him a scholarly practitioner of medicine capable of meeting contingencies which he has never experienced before rather than a medical practitioner limited to a few dictums memorized at the feet of some didactic mentor?

Please forgive my inability to explain in detail why research work makes a medical school a better school. The answer perhaps lies in the word "atmosphere." For instance, a child reared in a family of scholarly attainment usually becomes an adult of scholarly attainment; this is true even though the parents may be almost totally noncommunicative and make absolutely no conscious attempt to bring about this final result. Yet, it usually happens. I often think of a teacher whom I had in my medical school, Dr. Fritz Lipmann, whom I never saw personally as a student, whom I never heard as a student, but whose research work conditioned so greatly the minds of all my teachers that the atmosphere of his presence was transmitted to me as a student, and whose authoritativeness in his field led to authoritativeness in my teachers, and whose accomplishments in his field led to emphasis in lectures of principles which were not to be emphasized elsewhere for almost 10 years but which finally brought Dr. Lipmann the Nobel prize for his contribution to the world a dozen years after the contribution

was made. Dr. Lipmann was as much one of my teachers as if he had been in the laboratory instructing me alone. At a later date, though not as a student, I came to know Dr. Lipmann briefly, and each time that I have seen him since I glow with pride to think that he was one of my teachers.

I often find it almost incredible to believe that atmosphere alone in a medical school can teach students better than can I with all my efforts and lectures. Yet, each time I analyze my best students I find them to be those students who teach themselves, and then I wonder how important I myself may be to this process of student learning. The mass of information available in my field of medicine alone is hundreds of times as great as that which I can give in a series of documented speeches. Therefore, my purpose as a teacher, whether I admit it or not, is nothing more than to be a leader, setting the trends of thought for my students. If these trends are shallow, so will the thoughts of the students be shallow; if these trends are deep and judicious and critical, so will these qualities be found in my students' later attitudes. Or let us use the word "atmosphere" once again, blaming what the student learns on the tenor of the surroundings and blaming this tenor on the scholarly attainments and scholarly attitudes of the teachers. Perhaps, then, this word "atmosphere" is the best answer to the historical sequence of events: that a research atmosphere creates scholarship and leadership in a medical school, and that this atmosphere creates students motivated to quest the depths of medical understanding thus eventuating in better practice of medicine.

Finally, a factor often forgotten is the moral responsibility of medical schools to promote research work. Where else in all the world is congregated both the extreme opportunity and high degree of intelligence needed to carry on medical research work except in the medical schools? Almost all ideas for research work come from teachers—the men who must answer continually the detailed inquiries of their own minds and of the students' minds. If these ideas should be thrown away as they appear, the rate of gaining new knowledge in the field of medicine would be retarded almost to the vanishing point. It is almost unbelievable that such valuable intellectual gains should be allowed to drift into oblivion before they are tested by scientific methods and recorded for the world's permanent use. Indeed, by making proper use of these opportunities in the past, it can calculated that the total cost of medical research in America for each man-year of added life expectancy has been only slightly more than one dollar. If these same statistics are applied to the whole world, the cost of each added man-year of life has been only 10 to 20 cents, and, if applied to man yet to live in all the thousands of years to come, the cost has been only a small fraction of a cent per man-year of life.

Therefore, a medical school which fails to pursue an active research program concurrent with the teaching program should not want to exist in our modern medical society, subsisting on the investigative fruits of other schools. Indeed, this could be called medical school immorality, and such a trend might cause more harm to the future of mankind than all of man's wars. Thus, it is very disheartening to think of a medical school which fails to make maximal efforts in this direction.

Definition: **RESEARCH—A second look—discovery of the very essence of the learning process, enquiry.**

Investigación y enseñanza

¿Puede un profesor dedicar mucho tiempo a la investigación y seguir siendo un buen maestro? A esta pregunta se podría contestar con otra: ¿Es posible sea un buen profesor el que nunca ha emprendido investigación alguna? El autor piensa que nunca se encontrará una contestación definitiva a estas preguntas, pero considera significativos algunos argumentos oídos en discusiones en las Escuelas de Medicina, así como ciertas definiciones del "investigador" presentadas durante el Congreso sobre la enseñanza de Medicina cardiovascular y en otro sobre la enseñanza de las ciencias básicas. Luego discute el problema de la relación entre investigación y enseñanza, en lo que se refiere a la educación médica, enumerando algunos argumentos de carácter general en pro y en contra de la necesidad de la investigación por parte de los profesores de Medicina. Se llega a la conclusión de que la investigación específica de un profesor puede enriquecer la instrucción que éste imparte a los estudiantes, aunque a veces hay el peligro de que les abrume con una serie de datos que no tienen interés alguno para ellos, y los cuales, incluso, ellos no son capaces de entender. También es preciso ponerse en guardia contra el concepto de que cualquier investigación es válida e importante. Además, aun los que están convencidos de que el trabajo de investigación es parte esencial de todas las Escuelas de Medicina, tienen que admitir que hay algunos profesores que carecen totalmente de interés en tales trabajos. Otro aspecto del problema es de la participación activa de los estudiantes en algunos proyectos de investigación, lo cual es costumbre en mayor o menor grado en casi todas las Escuelas de Medicina de los Estados Unidos. El hecho es que la tendencia actual de las Escuelas de Medicina en este país es hacia la investigación, siempre creciente, y, dice el autor, que por mucho que se critiquen excesos y defectos de esa tendencia, no se puede negar que desde los más lejanos tiempos las Escuelas de Medicina más reputadas y las que cuentan con los estudiantes de más alto nivel son esas en que florece la investigación científica. Y, se pregunta, ¿en qué otro lugar del mundo si no en las Escuelas de Medicina, se reuniría, al mismos tiempo, la más grande oportunidad y el más alto nivel de inteligencia y capacidad para llevar a cabo la investigación médica científica? "Por lo tanto," concluye el autor, "una Escuela de Medicina que deja de poseer un programa de investigación activa, en unión a su programa de enseñanza, no debería existir en nuestra sociedad médica, pues subsistiría sobre la base de los frutos de investigación de otras Escuelas. Y esto debería ser condenado como 'inmoralidad', desde el punto de vista de la educación médica. . . ."

* * *

Separatas de este artículo, en español, podrán obtenerse si son solicitadas por un mínimum de 25 lectores.

The Study of Applicants, 1955-56

HELEN HOFER GEE

IT SEEMS APPARENT that medical schools are entering a period of increasingly heavy application activity. This upward change in trend, predicted last year in the 1954-55 report,[1] became evident in the current study of the fall 1955 freshman applicant group. For the first time in six years, the number of medical school applicants has shown a slight but definite increase. This trend is expected to continue.

Number of applicants

Table 1 shows the number of applications submitted by individual applicants since 1948. Both the number of students applying and the number of applications per individual have increased over last year. In 1955, 3 per cent more students applied for entrance to medical school than in 1954. Each of these individuals submitted more separate applications, on the average, than in any previous year for which records are given (except for 1950), and the increase in total number of applications over the previous year amounts to 14 per cent.

The number of applicants for places in the 1955 entering class was just 61 per cent of the 1949 peak. There continue to be about two applicants for each vacancy (actually 1.96). As usual, a fifth of the 1955 group of medical school applicants are repeaters from previous years.

School breakdowns

Table 2 lists each medical school, the size of its freshman class, the number of its applicants, and the total number of applications filed by its applicants. There is a vast school-to-school range in the number of applications received per available place in the freshman class. The ratio is less than 2 to 1 for some schools, although for others it is greater than

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[1]Stalnaker, J. M.: "The Study of Applicants, 1954-1955," *J. Med. Educ.* (1955) 30:625-36.

TABLE 1

SUMMARY OF APPLICATION ACTIVITY DURING THE PAST EIGHT YEARS

Freshman year	Number of applications	Number of individuals	Applications per individual
1948-49	81662	24242	3.4
1949-50	88244	24434	3.6
1950-51	81931	22279	3.7
1951-52	70678	19920	3.5
1952-53	56319	16763	3.4
1953-54	48586	14678	3.3
1954-55	47568	14538	3.3
1955-56	54161	14937	3.6

TABLE 2

EACH SCHOOL'S CAPACITY AND APPLICANT GROUP FILING ACTIVITY

School	Size of freshman class	Number of applicants			Total applications filed by applicants to each school	Average number of applications per applicant
		Men	Women	Total		
Alabama	79	162	12	174	499	2.9
Albany	60	986	56	1022	10690	10.5
Arkansas	92	162	12	174	258	1.5
Baylor	84	671	36	707	4949	7.0
Boston	72	1010	65	1075	10593	9.9
Bowman Gray	55	593	19	612	5382	8.8
Buffalo	80	783	34	817	8141	10.0
California, L.A.	49	419	41	460	3117	6.8
California, S.F.	78	451	52	503	3226	6.4
Chicago Medical	72	943	30	973	10084	10.4
Chicago, Univ. of	75	817	53	870	7926	9.1
Cincinnati	92	786	43	829	6490	7.8
Colorado	85	163	16	179	351	2.0
Columbia P & S	120	1360	139	1499	12878	8.5
Cornell	84	1299	122	1421	12208	8.6
Creighton	76	639	19	658	4945	7.5
Dartmouth	24	222	1	223	2221	10.0
Duke	78	675	25	700	5812	8.3
Einstein	56	815	41	856	8489	9.9
Emory	71	542	28	570	3758	6.6
Georgetown	113	873	48	921	8222	8.9
George Washington	102	1195	51	1246	11697	9.4
Georgia	98	200	13	222	500	2.3
Hahnemann	109	968	39	1007	8710	8.6
Harvard	115	1195	89	1284	9664	7.5
Howard	76	372	36	408	1772	4.3
Illinois	166	549	46	595	2493	4.2
Indiana	152	416	21	437	1802	4.1
Iowa	117	241	14	255	909	3.6
Jefferson	174	1786	—	1786	13066	7.3
Johns Hopkins	72	715	55	770	6953	9.0
Kansas	100	328	25	353	1960	5.6
Louisiana	119	282	16	298	1155	3.9
Louisville	94	260	10	270	961	3.6
Loyola (Stritch)	88	744	47	791	5555	7.0
Marquette	102	882	41	923	6217	6.8
Maryland	96	317	9	326	2255	6.9
Medical Evangelists	96	151	9	160	271	1.7
Meharry	67	465	42	507	1724	3.4
Miami	72	169	10	179	565	3.2
Michigan	201	571	29	600	2684	4.5
Minnesota	128	288	17	305	1168	3.8
Mississippi	77	190	6	196	307	1.6
Missouri	43	143	5	148	586	4.0
Nebraska	84	179	9	188	655	3.5
New York Medical	129	1760	133	1893	16759	8.9
New York University	120	1243	114	1357	13324	9.8
North Carolina	67	248	14	262	1446	5.5
North Dakota	37	129	5	134	768	5.7
Northwestern	130	1468	78	1546	11920	7.7
Ohio State	150	465	23	488	1961	4.0
Oklahoma	100	193	8	201	683	3.4
Oregon	77	283	19	302	1599	5.3
Pennsylvania	125	1384	85	1469	12518	8.5
Pittsburgh	100	662	40	702	4909	7.0
Puerto Rico	52	110	25	135	404	3.0
Rochester	71	982	55	1037	10163	9.8
St. Louis	122	926	25	951	7562	8.0
South Carolina	80	159	5	164	272	1.7
South Dakota	42	171	3	174	1193	6.9
Southern California	69	546	49	595	4257	7.2
Southwestern	102	400	38	438	1175	2.7
Stanford	58	431	52	483	3531	7.3
State U. of N.Y. (N.Y.)	148	1345	99	1444	13458	9.3
State U. of N.Y. (Syracuse)	76	917	51	968	9709	10.0
Temple	132	1441	69	1510	12075	8.0
Tennessee	201	369	24	393	948	2.4
Texas	154	475	33	508	1308	2.6
Tufts	111	580	48	628	4880	7.8
Tulane	129	877	44	921	6613	7.2
Utah	54	207	5	212	1256	5.9
Vanderbilt	51	619	24	643	6062	9.4
Vermont	50	392	25	417	3753	9.0
Virginia, Univ. of	76	548	26	574	4520	7.9
Virginia, Med. Coll. of	84	362	21	383	2492	6.5
Washington, Univ. of	75	358	18	376	2099	5.6
Washington (St. Louis)	84	1261	63	1324	10938	8.3
Wayne State	74	307	17	324	1058	3.3
Western Reserve	82	1112	72	1184	9331	7.9
West Virginia	31	108	8	116	406	3.5
Wisconsin	82	165	14	177	557	3.1
Woman's Medical	51	—	212	212	1153	5.4
Yale	78	955	64	1019	9193	9.0
Total	7602	50022	3239	54161		5.6

10 to 1.. Note that these ratios, which are not reported in Table 2, may be obtained by dividing the total number of applicants to each medical school (column 4 in Table 2) by the size of the freshman class (column 1 in Table 2).

The ratios that are listed in Table 2 (in column 6 on the far right) indicate the average number of different schools applied to by the applicants to each medical school. These figures were computed by dividing the entries in column 5 by the entries in column 4.

It should be noted that many of the schools with the largest number of applications relative to their facilities, receive a high proportion of applications from the students who are the most prolific filers. Thus the number of applications received per available space can be a somewhat misleading figure. For example, one school received 13.5 applications for each student vacancy, but the senders of these applications had also applied, on the average, to more than nine other medical schools. The effective number of students actually available to such a school is really smaller than the ratio of applications to vacancies would indicate.

The number of applications filed is itself a figure that varies widely among students, as Table 3 indicates. In 1955, as in past years, nearly 40 per cent of the applicants applied to only one school, about two-thirds limited themselves to three schools or less, and a few filed as many as 30 applications and more. Of the 65 per cent of the applicant group submitting no more than three applications, about half received at least one acceptance. Of the 7 per cent who submitted 10 or more applications, 58 per cent were accepted. Of the remainder, the 28 per cent of the applicant group filing four to nine applications, 61 per cent were accepted.

MCAT data

Table 4 presents Medical College Admission Test (MCAT) data for the 96 per cent of 1955 applicants on whom they are available. For rejected applicants, mean scores on all four MCAT subtests are lower than the scores of accepted applicants. The difference in mean scores of all accepted vs. nonaccepted applicants varies from 51 score points on the Modern Society subtest to 69 score points on the Quantitative Ability subtest.

TABLE 3

RELATIONSHIP OF ACCEPTANCES OFFERED TO NUMBER OF APPLICATIONS FILED

Number of applications filed	Applicants receiving one or more acceptances			Applicants receiving no acceptances			Total applicants			Per cent accepted
	Men	Women	Total	Men	Women	Total	Men	Women	Total	
1	2423	160	2583	2902	230	3132	5325	390	5715	45
2	1049	67	1116	1011	97	1108	2060	164	2224	50
3	1019	73	1092	620	59	679	1639	132	1771	62
4	780	50	830	435	32	467	1215	82	1297	64
5	538	41	579	341	23	364	879	64	943	61
6	384	41	425	263	15	278	647	56	703	60
7	273	16	289	200	11	211	473	27	500	58
8	228	17	245	118	8	126	346	25	371	66
9	150	10	160	131	6	137	281	16	297	54
10–14	437	23	460	311	12	323	748	35	783	59
15–19	123	5	128	84	1	85	207	6	213	60
20–24	37	—	37	32	4	36	69	4	73	51
25–29	15	—	15	11	—	11	26	—	26	58
30–34	6	1	7	9	—	9	15	1	16	44
35–	3	—	3	2	—	2	5	—	5	60
Total	7465	504	7969	6470	498	6968	13935	1002	14937	

TABLE 4

MCAT SCORES OF APPLICANTS CLASSIFIED BY NUMBER OF APPLICATIONS FILED

Number of applications filed	Mean MCAT scores of accepted applicants				Mean MCAT scores of rejected applicants			
	Verbal	Quantitative	Modern Society	Science	Verbal	Quantitative	Modern Society	Science
1	504	516	512	505	460	457	472	450
2	510	524	514	509	458	455	470	448
3	522	527	523	522	462	452	465	445
4	534	533	530	531	471	460	481	455
5	547	541	540	542	479	464	480	462
6	551	539	546	539	477	465	491	463
7	554	544	542	544	473	458	471	453
8	549	539	548	544	482	460	488	464
9	549	534	551	539	489	479	495	471
10–14	555	544	550	550	488	477	502	478
15–19	553	540	561	543	494	479	512	482
20–24	520	524	538	511	506	475	519	479
25–29	564	516	574	534	452	455	475	469
30–34	492	505	552	536	501	464	527	477
35–40	588	488	548	572	480	540	500	555
Average for total group	524	528	527	522	466	459	476	454

There appears to be a tendency, though not a completely consistent one, for students with higher MCAT scores to file a larger number of applications. A related tendency is discernible with regard to differences in mean scores between the accepted and nonaccepted applicants—as the number of applications per individual increases, the differences between mean scores of the two groups of applicants also increase. Note, for example, that on the Verbal Ability subtest of the MCAT, the difference in scores of accepted and nonaccepted applicants is 44 score points among all students who filed a single application. Among applicants who applied to seven schools, the difference in mean scores is 80 score points.

One factor that should be kept in mind in studying these data is that some schools are severely restricted with respect to residence requirements. Such schools are often constrained to accept one-school-only applicants at lower levels of ability than the accepted applicants of schools that are unrestricted by geographic residence requirements. It should further be noted that the findings with respect to test scores and number of applications are not necessarily inconsistent with the fact that, numerically, the largest number of accepted applicants come from the group filing not more than three applications—this same application-frequency group also produces the most rejected applicants (Table 3). It is still true that accepted appli-

TABLE 5

1955-56 ACCEPTANCE DATA BY NUMBER OF APPLICATIONS FILED FOR REPEATERS FROM 1954-55 APPLICANT GROUP

Number of applications filed	Accepted repeat applicants			Rejected repeat applicants			Total repeat applicants		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
1	393	19	412	706	49	755	1099	68	1167
2	137	5	142	261	21	282	398	26	424
3	127	6	133	165	13	178	292	19	311
4	83	4	87	112	6	118	195	10	205
5	61	4	65	67	3	70	128	7	135
6	46	3	49	66	3	69	112	6	118
7	37	3	40	51	1	52	88	4	92
8	32	2	34	28	2	30	60	4	64
9	25	0	25	33	1	34	58	1	59
10–14	86	1	87	75	1	76	161	2	163
15–19	31	0	31	24	1	25	55	1	56
20–24	7	0	7	6	2	8	13	2	15
25–29	2	0	2	3	0	3	5	0	5
30–34	1	0	1	3	0	3	4	0	4
35–40	1	0	1	1	0	1	2	0	2
Total	1069	47	1116	1601	103	1704	2670	150	2820

TABLE 6

MCAT SCORES OF REPEAT APPLICANTS CLASSIFIED BY NUMBER OF APPLICATIONS FILED

Number of applications filed	Mean MCAT scores of accepted repeat applicants*				Mean MCAT scores of rejected repeat applicants*			
	Verbal	Quantitative	Modern Society	Science	Verbal	Quantitative	Modern Society	Science
1	477	491	493	483	451	445	468	450
2	485	501	502	486	439	440	461	452
3	502	518	516	508	453	440	465	451
4	494	493	508	510	475	459	487	459
5	499	496	514	501	471	459	484	477
6	544	518	540	539	472	460	498	469
7	536	531	538	539	464	458	457	463
8	524	511	547	530	456	449	485	457
9	523	541	535	522	488	454	481	448
10–14	529	542	544	549	468	469	493	485
15–19	531	542	554	554	460	455	485	469
20–24	474	439	494	478	513	465	514	521
25–29	510	539	530	460	425	422	398	422
30–34	445	495	565	645	482	458	485	468
35–40	515	385	535	435	465	565	565	555
Total repeat group	497	506	512	504	455	448	472	457

*Applicants applying in 1955-56 who also filed applications in 1954-55.

cants from all application-frequency groups, considered as a whole, tend to have higher MCAT scores than do rejected applicants.

Repeat applications

About 20 per cent of the 1955-56 group had applied previously for entrance to the 1954-55 freshman class in medical school. Tables 5 and 6 summarize the data on this group of repeater applicants, of which 40 per cent were accepted in 1955-56. This figure compares with 57 per cent of the first-time applicant group who were accepted in 1955-56. Last year's acceptance proportions were quite similar, 38 per cent for the repeaters and 58 per cent for first-time applicants. Re-applicants had slightly lower mean MCAT scores than first-time applicants (Table 6), but these mean differences, ranging from 15 score points for Modern Society to 27 score points for Verbal Ability, are not imposing when compared with the variation within either group. For re-applicants, MCAT score differences between accepted and non-accepted students are smaller than comparable differences with respect to the initial applicant group. It should be pointed out that among the re-applicants are students who were considered favorably for acceptance upon first application, but were encouraged to undertake an additional year of undergraduate training.

Acceptance data

Table 7 shows that a large majority (three-fourths) of the accepted applicant group, including repeaters, received one acceptance; less than one-fifth received two acceptances.

TABLE 7

NUMBER OF ACCEPTANCES OFFERED TO SUCCESSFUL FIRST-TIME AND REPEAT APPLICANTS

Number of acceptances	Accepted repeat applicants*			Accepted first-time applicants			Total accepted applicants		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
1	889	44	933	4685	344	5029	5574	388	5962
2	147	2	149	1218	77	1295	1365	79	1444
3	24	—	24	375	29	404	399	29	428
4	6	1	7	93	5	98	99	6	105
5	1	—	1	21	1	22	22	1	23
6	1	—	1	3	1	4	4	1	5
7	1	—	1	1	—	1	2	—	2
Total	1069	47	1116	6396	457	6853	7465	504	7969

*Applicants accepted for 1955-56 who had also filed applications for 1954-55.

Again caution is urged in literal interpretation of the figures. More students might have received multiple acceptances, but many are prompt in withdrawing other applications when accepted by the school of their first choice. Furthermore, medical schools not infrequently cease to consider students who have received an acceptance from another school. Nevertheless, 30 popular candidates were accepted by five, six or seven schools. As shown in Table 8, the popular candidates are exceptionally bright students, and competition for them among medical schools is keen.

Geographical distribution

Table 9 shows the geographical distribution of applicants and again reveals heavy concentration in a few states. Seven states provided nearly half of all applicants, and three states (New York, California and Pennsylvania) accounted for 29 per cent of the applicants. New York alone provided 15 per cent of the total applicant group; this populous state provided 13 per cent of all accepted applicants to medical school, but the proportion of its applicants accepted is 47 per cent. Over-all, 53 per cent of the nation's applicants to the 1955-56 freshman classes in medical schools were accepted.

Trends

As shown in a recent editorial in this journal,[1] the number of medical school applicants relative to the number of undergraduate college graduates reached a low point in 1953. During the past two years, this ratio has shown some improvement. Of course one fact that should be taken into consideration is that many applicants are accepted into medical schools without degrees after three years of undergraduate training. However, the number of medical schools requiring four years of undergraduate training has actually been increasing,[2] which suggests that the indicated improvement in the "drawing power" of the medical professional school is, if anything, underestimated. Even if the ratio of medical school applicants to college graduates shows no appreciable increase during the next few years, existing trends indicate a steady increase in the number of applicants to at least 20,000 by 1961.

[1] *J. Med. Educ.* (1956) 31:493-95.

[2] *Admission Requirements of American Medical Colleges 1957* (Chicago: AAMC, 1956), 3-4.

TABLE 8

MCAT SCORES OF ACCEPTED APPLICANTS CLASSIFIED BY NUMBER OF ACCEPTANCES RECEIVED

Number of acceptances	Number of accepted applicants*	Mean score on the MCAT			
		Verbal	Quantitative	Modern Society	Science
1	5697	513	518	518	511
2	1429	550	550	544	547
3	427	573	566	564	571
4	105	595	580	583	588
5	23	599	578	608	619
6	5	603	595	595	579
7	2	640	605	645	625
Total	7688	524	528	527	522

*Number for whom test data were available.

TABLE 9

ACCEPTANCE DATA ON APPLICANTS BY STATE

State	Applicants receiving one or more acceptances			Applicants not accepted			Total number of applicants	Total number of applications
	Men	Women	Total	Men	Women	Total		
Alabama	115	8	123	72	14	86	209	525
Arizona	23	2	25	14	1	15	40	105
Arkansas	102	9	111	68	5	73	184	283
California	416	32	448	463	57	520	968	4488
Canada	8	1	9	52	6	58	67	202
Colorado	80	7	87	60	4	64	151	233
Connecticut	99	8	107	86	5	91	198	1124
Delaware	9	—	9	7	2	9	18	80
District of Columbia	46	8	54	55	9	64	118	405
Florida	177	10	187	121	4	125	312	925
Foreign	75	9	84	123	11	134	218	803
Georgia	153	9	162	118	11	129	291	654
Idaho	24	2	26	16	—	16	42	190
Illinois	370	30	400	315	33	348	748	2498
Indiana	182	12	194	145	6	151	345	737
Iowa	132	4	136	54	4	58	194	551
Kansas	90	3	93	50	10	60	153	285
Kentucky	127	3	130	80	5	85	215	434
Louisiana	161	10	171	80	5	85	256	437
Maine	20	3	23	18	—	18	41	162
Maryland	102	5	107	93	6	99	206	671
Massachusetts	218	13	231	196	19	215	446	2224
Michigan	290	12	302	219	15	234	536	1420
Minnesota	155	9	164	86	4	90	254	481
Mississippi	112	5	117	108	3	111	228	350
Missouri	127	2	129	95	5	100	229	737
Montana	25	—	25	12	2	14	39	124
Nebraska	93	7	100	46	2	48	148	265
Nevada	2	—	2	5	—	5	7	25
New Hampshire	25	2	27	12	1	13	40	164
New Jersey	267	15	282	284	25	309	591	3289
New Mexico	12	1	13	12	2	14	27	68
New York	962	83	1045	1098	82	1180	2225	14678
North Carolina	148	5	153	105	7	112	265	655
North Dakota	35	2	37	8	1	9	46	74
Ohio	393	23	416	302	15	317	733	2566
Oklahoma	124	7	131	69	2	71	202	414
Oregon	71	4	75	37	2	39	114	278
Pennsylvania	545	46	591	545	35	580	1171	4176
Puerto Rico	54	7	61	38	15	53	114	249
Rhode Island	35	—	35	49	1	50	85	477
South Carolina	99	4	103	84	2	86	189	289
South Dakota	41	2	43	18	—	18	61	122
Tennessee	199	10	209	57	2	59	268	401
Texas	331	26	357	237	24	261	618	1490
U.S. Territories and Possessions	29	5	34	73	5	78	112	379
Utah	60	—	60	41	1	42	102	306
Vermont	17	3	20	6	1	7	27	53
Virginia	151	13	164	99	6	105	269	647
Washington	98	6	104	98	5	103	207	606
West Virginia	66	5	71	84	5	89	160	515
Wisconsin	151	10	161	75	7	82	243	493
Wyoming	12	1	13	7	1	8	21	48
Not Stated	7	1	8	175	3	178	186	400
Totals	7465	504	7969	6470	498	6968	14937	54161

Editorials and Comments

Report of Ten Years Giving to Medical Education

IN THE ANNUAL Report of the Commonwealth Fund for 1956 is included a very impressive summary of the Fund's benefactions to medical education over the 10 year period 1947-1956.

Of the total appropriations of approximately $40 million made by the Fund in the past 10 years, 51 per cent has gone to medical education. Up until this last year the grants to medical schools were largely restricted and were chiefly in the interest of developing stronger departments of psychiatry, facilitating the integration of psychiatry into other clinical fields, strengthening departments of preventive medicine, and giving support to the development of the comprehensive approach to patient care. This past year, however, "the Fund added the principle of unrestricted giving to universities for medical education to its already established policy of grants for specifically budgeted projects and programs."

Of the 40 universities and medical schools both public and private, which have benefitted greatly through the past 10 years by the grants for specifically budgeted projects and programs, 10 were selected for the unrestricted gifts of this past year totalling approximately $20 million.

The Commonwealth Fund's 10-year record in support of medical education is an astounding one which reflects the interest, understanding and foresight of the president, board of directors and staff. D.F.S.

College Teachers' Salaries Are Still Low

THE Research Division of the National Education Association has just released a bulletin reporting on the salaries received by teachers and administrators in universities, colleges and junior colleges of the U. S. in 1955-56.

The median salary of professors was $7076, of associate professors $5731, assistant professors $4921, instructors $4087. For teachers of all ranks combined the median salary was $5243.

The median salaries paid teachers in municipal institutions was the highest, $6435. Above the median for all types of institutions were the salaries paid in state universities ($5649), non-public universities ($5585), land-grant colleges ($5458) and teacher's colleges ($5401). Below the median for all types of institutions were the salaries paid in state colleges ($4992), non-public colleges of over 1,000 enrollment ($4756), non-public colleges of 500-999 enrollment ($4411) and small non-public colleges ($4081.)

Administrative officers, who are usually on full year service, fared

somewhat better with a median of $11,314 for presidents, $10,467 for vice-presidents, $7495 for deans of colleges, $6682 for business managers, $6127 for directors of admissions, $5437 for head librarians and $5230 for registrars.

From this very informative report it is evident that though college salaries have been somewhat increased, they are still relatively low. The figures make it very plain why it is essential that college teachers as a whole be permitted to supplement their regular salary by consultation services, writing, editing and other outside services related to their field of interest. The urgent need for special retirement plans for career teachers is also obvious if the present practice of obligatory retirement at age 65 is continued. D. F. S.

1. "Salaries Paid and Salary Practices in Universities, Colleges and Junior Colleges, 1955-56," Research Division, National Education Association, 1201 Sixteenth St., N. W., Washington 6, D. C. (50 cents)

Roll Call of Markle Scholars

SINCE 1948 the Markle Foundation reports[1] that 456 persons have been nominated by their medical schools for Markle Scholar grants. Of the 456 nominees, 372 were reviewed by the selection committees, and 181 received the grants. A total of $5,320,000 has been appropriated toward their support. Of the 181 appointed as Markle Scholars, 142 were holders of the M.D. degree, 16 were holders of the Ph.D. degree and 23 were holders of both degrees.

After nine full years of operation of the plan, the present roll call reveals that: one is a dean of a medical school; five are assistant or associate deans, 23 have become heads of departments in various medical schools; one directs an important cancer research institute; two head research divisions in government laboratories; 25 hold the title of full professor; 51 hold the title of associate professor (some of these are also included in the list of associate or assistant deans); four have entered full-time private practice; and two have been killed in automobile accidents.

It is certainly evidence of great wisdom and skill in the selection process that more than half of these young men and women have already risen to positions of eminence in the field of medical education and research in the short period of nine years. In view of the fact that 23 started as Markle Scholars only on July 1, 1956, and an equal number only one or two years earlier, it is a remarkable record of accomplishment of which the Markle Foundation can well be proud. D. F. S.

1. 1955-56 Annual Report of the John and Mary R. Markle Foundation, 511 Fifth Ave., New York 17, N. Y.

The incoming and outgoing presidents of the AAMC are shown above. Left, Dr. Robert A. Moore, vice chancellor of the Schools of the Health Professions, University of Pittsburgh, the 1955-56 president; and Dr. John B. Youmans, dean, Vanderbilt University School of Medicine, the 1956-57 president.

Report of the 67th Annual Meeting

REPORTS ON EXPERIMENTS in medical education comprised three full half-day sessions of the 67th Annual Meeting of the Association of American Medical Colleges, held November 12-14 at The Broadmoor, Colorado Springs, Colo. Ten schools were represented by these reports, which covered topics ranging from general practice to cooperation with foreign medical schools. Some of these reports will appear in full in forthcoming issues of The Journal.

Pre-Conference Meetings

The Annual Meeting opened officially on Monday, November 12, with an attendance of over 430 but there were a number of preconference sessions. On Saturday, November 10, the 1955-6 Executive Council and the Joint Committee on Medical Education in Time of National Emergency met with medical representatives of various government agencies. Included were the VA, Army, Navy, Air Force, Department of Defense, Civil Defense Agency, Selective Service, MEND and the Public Health Service.

Conference Reports

The meeting was opened Monday morning by Dr. Robert A. Moore, vice chancellor of the Schools of the Health Professions, University of Pittsburgh and AAMC president for 1955-56.

Dr. Moore's speech, entitled "A Medical Concerto for Viola and Violin-cello," was an allegorical description of essential cooperation between practitioners and teachers. Dr. Moore said, "The classical double concerto, free of demonstration of technical acrobatics by either soloist, but with unequal masses of instruments, offered an ideal means for depicting medicine."

Present at the meeting between the Executive Council and the Joint Committee on Medical Education in Time of National Emergency and various government agencies were (left): Col. Richard Eanes, chief medical officer of the Selective Service System; and Dr. Herman G. Weiskotten, dean emeritus of the State University of New York College of Medicine at Syracuse, and chairman of the Council on Medical Education and Hospitals of the AMA.

Dr. David Price, assistant surgeon general, USPHS; Oscar Levin, program analyst, National Science Foundation; and Dr. John B. Barnwell, assistant chief medical director for research and education, VA, who also attended the meeting described above.

Dr. John T. Cowles, chairman of the 1956 Teaching Institute.

Monday morning's session also featured "Reflections from the Teaching Institute on the Evaluation of the Student—The Appraisal of Applicants to Medical Schools," which was held November 7-10, immediately preceding the Annual Meeting. Speakers and their subjects were:

Dr. George Packer Berry, dean of the Harvard Medical School and chairman of the AAMC's Committee on Educational Research and Services—The Association's Program of Teaching Institutes; Dr. John T. Cowles, assistant for personnel services to the vice chancellor of the Schools of the Health Professions and professor of psychology, University of Pittsburgh—Development of the 1956 Institute on Appraisal of Applicants to Medical Schools; Dr. Robert J. Glaser, associate dean and assistant professor of clinical medicine, Washington University School of Medicine—Evaluating Intellectual Characteristics of the Applicant; Dr. Charles R. Strother, professor of clinical psychology, department of psychiatry, University of Washington School of Medicine—Evaluating Non-Intellectual Characteristics of the Applicant; Dr. Carlyle F. Jacobsen, executive dean for medical education, State University of New York—A Critical Look at the Whole Admissions Process; Dr. John McK. Mitchell, dean of the University of Pennsylvania School of Medicine—The Significance of the Institute from a Dean's Standpoint.

Among the representatives of government agencies who conferred with the Executive Council and the Joint Committee on Medical Education in Time of National Emergency were (left to right): Dr. James Schofield, National Coordinator, MEND; Capt. Richard Fletcher, USN; and Col. Sheldon Brownton, director of staff for Assistant Secretary of Defense, Health and Medicine.

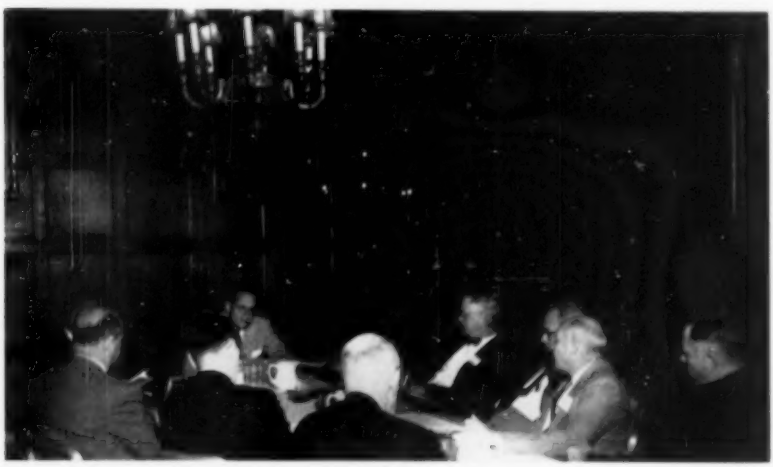
Borden Award

Dr. Harry S. N. Greene, the Anthony N. Brady professor of pathology at Yale University School of Medicine, was presented with the 1956 Borden Award in the Medical Sciences. The award, consisting of a gold medal and $1,000, was presented by John H. McCain, secretary of the Borden Company Foundation, Inc. Dr. Joseph Markee, of Duke University, and chairman of the Committee on the Borden Award, made the nominating address.

Dr. Greene's nomination was based on his many contributions in the field of oncology. He developed a technique making it possible to grow the malignant uterine tumor of the rabbit in the anterior chamber of the eye of the guinea pig. He also proved that, in general, embryonic tissues and certain neoplasms, can be successfully transplanted to the anterior chamber of the eye of an alien species, while normal tissues and most benign neoplasms cannot. Dr. Greene proved that those neoplasms in man that were transplantable to an alien species were those most likely to metastasize in the original host.

Dr. Harry S. N. Greene, winner of the 1956 Borden Award in the Medical Sciences. He is the Anthony N. Brady, professor of pathology at Yale University School of Medicine.

Also, he developed a technique making it possible to grow heterologous tissue in the brain as effectively as in the eye of certain experimental animals, and he contributed to the development of techniques whereby human embryonic endocrine tissues can in some instances be successfully transplanted in patients suffering from such deficiency states as that which exists in Addison's disease.



The Editorial Board, shown in its closed pre-meeting session on Sunday morning, November 11. The Association's standing committees all held their closed sessions on Sunday.

Adolph William Schmidt

Annual Banquet

Main speaker at the Annual Banquet on Monday evening was Adolph William Schmidt, president of the A. W. Mellon Educational and Charitable Trust, whose topic was "Medicine and the Liberal Arts."

Urging increased emphasis on liberal arts, Mr. Schmidt recommended that the medical schools require twice as many humanities and social studies courses as they do now in natural sciences, for the four-year undergraduate curriculum.

He quoted from medical college bulletins themselves which called for more liberal arts courses, and cited from the Questionnaire Analysis of the 1956 Teaching Institute that 71 per cent of the June 1956 undergraduate school graduates questioned replied that they would have found "more emphasis on social sciences and humanities helpful."

He was critical of the departmental and elective systems, saying that they created overspecialization, and he recommended a return to the works of the great thinkers of Western civilization. He gave as a sample curriculum that of St. John's in Annapolis, which has a four-year fixed curriculum, no electives and no textbooks. The students read more than 100 great books, and the basic philosophy of the faculty is "E-Duco" or "draw out from the student."

In describing liberal arts education as "education for life," Mr. Schmidt said "Liberal education, as distinguished from vocational training, is education for freedom, and this means that it is education for the

Among the many visitors from abroad who attended the 67th Annual Meeting were *left* Dr. Louis Monteiro, dean of the Topiwala National Medical College and B.Y.L. Nair Hospital, Bombay; and Dr. S. G. Vengsarkar, dean of the Seth G.S. Medical College and K.E.M. Hospital, Bombay.

The above representatives from the Republic of the Philippines attended the sessions of the 67th Annual Meeting. *Back row, left:* Dr. Agerico B. M. Sison, dean of the University of the Philippines College of Medicine; Dr. Jose Cuyegkeng, acting dean of the College of Medicine, University of the East; Dr. Julian Paguyo, superintendent of private medical education, Department of Education, Republic of the Philippines; and Lauro H. Panganiban, dean, Institution of Medicine, Eastern University, Manila. *Front row, left:* Dr. Jose R. Reyes, director, North General Hospital, Manila; Dr. Tranquilino Elicama, chairman of the Board of Medical Examiners; Dr. Floria Velasquez, acting dean, Manila Central Medical College; and Dr. Virgilio Ramos, dean, College of Medicine, University of Santo Tomas.

responsibilities of citizenship and for the good use of leisure."

Business Meeting

At the Business Meeting on Tuesday, November 13, 221 new Individual Members were voted into the Association. 1956 was the third year these memberships were offered, and the new members make a total of 1544 active individual memberships at this time.

It was also reported that during 1956, six new sustaining memberships were received. The new sustaining members are: Burroughs, Wellcome & Co., Inc.; Ciba Pharmaceutical Products, Inc.; Eli Lilly & Co.; Parke, Davis & Co.; G. D. Searle & Co.; and Chas. Pfizer & Co., Inc. This brings the sustaining memberships to a total of eight, W. B. Saunders Co. and E. R. Squibb & Sons having joined in 1955. The University of Miami was

Dr. Kwik Hok Tiang, Arriangga University, Surabao, Indonesia, another visitor from overseas.

voted into full institutional membership, bringing the Association's total to 83 full institutional members, and 12 affiliate institutional members.

The Business Meeting included reports of the AAMC's standing committees, plus the reports of the Executive Council, the secretary and the treasurer, the director of research and the director of the Medical Audio-Visual Institute.

The Association voted approval to a statement urging its member institutions "to survey their potentialities and capacities in the light of the future need for health personnel," and urging universities in large urban centers, now without a medical school, to give serious consideration to the establishment of one. This statement indicates the need the Association feels is present for meeting the health care requirements of our growing population and changing civilization, not only through expansion of the existing schools, but the creation of *new* schools so that "forced" expansion will not lower standards.

The Association voted "yes" to three changes in the by-laws, providing (1) that an Immediate Past President and an Executive Director be added to the list of officers, and that the Secretary and the Executive Director be appointed by the Executive Council. *(Dr. Ward Darley, now president of the University of Colorado, will be the first Executive Director of the Association, effective January 1, 1957);* (2) that the Executive Director and Secretary shall be ex officio members of the Executive Council, without vote, but shall attend all Council meetings except closed executive sessions; (3) that the Annual Dues of two-year Institutional Members be fixed at $500.

It was announced that the Executive Council had voted $1,000 donation to the Second World Congress on Medical Education, to be held in Chicago in 1959. The Association is represented on the program committee for this congress.

The Association will be one of the sponsors of Medical Education Week,

The 1956-57 Executive Council of the AAMC is shown at its first session. Counterclockwise: Dr. William N. Hubbard; Dr. Stanley B. Olson; Dr. John McK. Mitchell; Dr. Stockton Kimball, treasurer; Dr. Dean F. Smiley, secretary; Miss Melba Allyn (staff); Dr. John B. Youmans, president; Dr. Robert A. Moore, immediate past president; Dr. Harold S. Diehl; Dr. Gordon H. Scott, vice-president; Dr. Ward Darley, executive director; and Dr. John F. Sheehan. Not present were Dr. Lowell T. Coggeshall, president-elect; Dr. John Z. Bowers; and Dr. Thomas H. Hunter. Dr. Olson will finish out Dr. Coggeshall's term on the Council, since Dr. Coggeshall was named president-elect.

to be held in April 1957, and will be co-sponsor of the International Institute on Exchange of Persons, to take place in June 1957.

In the report of the Secretary, Dr. Smiley announced that Dr. Robert J. Glaser, Dr. Leonard D. Fenninger and Dr. Arthur Ebbert Jr. have been appointed part time assistant secretaries, to assist in the 16 visitations planned for 1957.

The following telegram was sent to Dr. Abraham Flexner: "The Association of American Medical Colleges, in Annual Meeting, sends its enthusiastic acclaim to you, the foremost leader in medical education our nation has known, on the occasion of your 90th birthday. May we acknowledge again our very great debt to you."

It was announced that the dedication of the Association's new building would take place on February 10, 1957, and transportation from Chicago's loop would be available.

Two film programs were presented Tuesday evening. Of general interest was "All My Babies," a documentary, and of special medical interest were "Microglia," "Oligodendroglia," and "The Motion Picture in Medical Education," all teaching films. Dr. J. Edwin Foster, director of the Medical Audio-Visual Institute, arranged the film program.

1957 Meeting

The 68th Annual Meeting of the Association will be held October 21-23, 1957, at the Chalfonte-Haddon Hall, Atlantic City, N. J.

New Officers

New officers elected for the coming year are: Dr. John B. Youmans, Vanderbilt, president; Dr. Lowell T. Coggeshall, U. of Chicago, president-elect; Dr. Gordon H. Scott, Wayne State University, vice president; Dr. Dean F. Smiley, AAMC, secretary; and Dr. Stockton Kimball, Buffalo, treasurer. The new Council members, with 3-year terms, are Dr. Harold S. Diehl, Minnesota; and Dr. John McK. Mitchell, Pennsylvania. Dr. Stanley B. Olson, Baylor, was elected to fill out Dr. Coggeshall's uncompleted term.

Dr. Ward Darley, president of the University of Colorado, who will assume the position of executive director of the Association on January 1.

The 1955-56 Executive Council is shown at its last meeting. Counterclockwise: Dr. John F. Sheehan; Dr. Thomas H. Hunter; Dr. George N. Aagaard; Dr. Vernon W. Lippard; Dr. William N. Hubbard; Dr. Dean F. Smiley; Dr. Robert A. Moore; Miss Melba Allyn (staff); Dr. Lowell T. Coggeshall; Dr. Stockton Kimball; Dr. John B. Youmans; and Dr. Walter R. Berryhill

NEWS DIGEST

AAMC MOVES TO NEW HOME

This month marks the installation of the Association of American Medical Colleges in its new brick and lannon stone building at 2530 Ridge Ave., Evanston, Ill. Located on a site which was presented to the Association by Northwestern University, the one-story building contains office space on the ground floor, with conference room, kitchen, mail room and storage space in the basement. The architects were Holabird & Root & Burgee.

Those occupying the space will be: Dr. Ward Darley, the new Executive Director. (Dr. Darley, formerly the president of the University of Colorado, takes over this newly-created post January 1, 1957;) Dr. Dean F. Smiley, the association's Secretary; the central staff; the Journal of Medical Education; the Medical Audio-Visual Institute; the National Intern Matching Program, Inc., and the Committee on Educational Research and Services. The building will be formally dedicated February 10, 1957.

Commonwealth Fund Reports

Grants totaling $15,140,154.82 for the fiscal year 1955-56 were reported by the Commonwealth Fund in its 38th annual report. Of this total, $12,600,000 represented unrestricted grants to 19 universities in order to assist them in strengthening their programs of medical education. In its report the Fund reviews the direction and rapidity of growth in medical education during the past 10 years and relates this year's unrestricted gifts to other support for medical education which it has extended during earlier years to 40 universities and medical schools.

James Picker Foundation Awards

In order to encourage research offering promise of improvement in radiological methods of diagnosis or treatment of disease, the James Picker Foundation has made available a number of grants-in-aid, fellowships and grants to scholars for radiological research. These awards are administered for the Foundation by the Division of Medical Sciences, National Academy of Sciences, National Research Council.

The council is also announcing the availability of other postdoctoral research fellowships for 1957-58. The purpose of these awards is to provide potential leaders in medical science with the opportunities for advanced study and experience in research. They are open to men and women who hold the M.D., Ph.D., or Sc.D. degree and to graduate students who will receive their doctorate before December 1957.

For additional information address: Division of Medical Sciences, Room 309, National Academy of Sciences, National Research Council, 2101 Constitution Ave., N.W., Washington 25, D.C.

Symposium on Premedical Education

A review and discussion of some of the current problems in premedical education will be the theme of the Alpha Epsilon Delta Society's

meeting on December 29, which is to be held in conjunction with the meetings of the American Association for the Advancement of Science held in New York City at this time. Alpha Epsilon Delta, national premedical honor society, is cooperating with divisions of the association and with Cornell University Medical College in presenting the symposium. Attention will be focused on the current discussion of the proper balance of sciences and humanities in the preparation for the study of medicine. All persons interested in premedical education and student guidance are invited to attend.

Easter Seal Grants Announced

First grants to be awarded by the Easter Seal Research Foundation have been announced by the chairman of the foundation's board of trustees. The five grants awarded for study concerning prevention of physical and associated disabilities and improved methods for their treatment, intensify the role of research in the program of the National Society for Crippled Children and Adults, the Easter Seal Society. They are made possible through contributions to the Easter seal campaign and special gifts and bequests. Awards were given to Albany Medical College, the American Academy for Cerebral Palsy, the American Academy for Cerebral Palsy Brain Registry, the Ohio State University, and the University of North Carolina School of Medicine.

New Army Brochure on Medical Internships

A new brochure on the Army Medical Intern Program has been issued in order to indicate the army facilities and the operation of the medical program. The booklet is designed to show young doctors concerned with a decision as to where they will intern, just what the Army can offer them. Copies of the new brochure can be obtained from medical headquarters including the Army Medical Service Procurement Officer, Medical Section, Hqrs., First Army, Governors Island, N. Y.

National Conference on Exchange of Persons

The Institute of International Education will hold its second national conference on exchange of persons, December 5-7 at the Congress Hotel in Chicago, Ill. Participating organizations include the AAMC and the theme will be the need to educate men and women to international responsibilities. A special workship session of medicine and health will be held on Thursday, December 6.

College Briefs

Albany

Dr. JOSEPH L. GLENN has been appointed assistant professor in biochemistry for one year. Under the provisions of a grant from the Public Health Service, he is conducting research on oxidative enzymes of brain tissue and their relation to energy production. Dr. Glenn is also teaching biochemistry to undergraduates.

Alabama

Dr. WILEY KEMP LIVINGSTON has been appointed assistant professor of ophthalmology and acting chairman of the department. Dr. BEAMON COOLEY Jr. and Dr. CHARLES P. GRANT, have been appointed associate professors of ophthalmology. Dr. JOHN DAVIS MCCULLOUGH has been named assistant professor of clinical psychiatry; and Dr. SIDNEY M. JOURARD, assistant professor of clinical psychology. Dr. DORIS WARE has been named assistant professor of pathology. Dr. JOHN E. PAUL has been appointed assistant professor of speech pathology and Dr. ROBERT E.

ROACH, assistant professor of audiology.

Cincinnati

The Institute of Industrial Health is offering graduate fellowships in industrial medicine. The Institute provides professional training for graduates of approved medical schools who have completed at least one year of internship. Their three year course of instruction leads to the degree of Doctor of Science in Industrial Medicine and satisfies the requirements for certification in occupational medicine by the American Board of Preventive Medicine. Stipends for the first two years vary from $3,000 to $4,000 depending on marital status. In the final or residency year a fellow is compensated by the organization in which he is completing training. A one year course is also offered to qualified applicants with the possibility of a Master of Science degree. Requests for additional information should be addressed to the Secretary, Institute of Industrial Health, College of Medicine, University of Cincinnati, Eden and Bethesda Avenues, Cincinnati 19, Ohio.

Colorado

Dr. C. HENRY KEMPE has been appointed head of the department of pediatrics. In addition, Dr. Kempe will be on the staff of the National Jewish Hospital. Dr. Kempe was on leave last year from his former school, The University of California, to the Rockefeller Virus Laboratory in Rome on a Fulbright research grant. He has also carried out such activity in India and Indo-China.

C. Henry Kempe

Columbia

Dr. ANDRE F. COURNAND, professor of medicine and Dr. DICKINSON W. RICHARDS, Lambert professor of medicine, have received the 1956 Nobel Prize in Medicine. The award was given because of the perfection of a method of cardiac diagnosis and research involving insertion of a thin, plastic tube about four feet long into the heart. The result has been improvement in the diagnosis of diseases of the heart and lungs, and has been called "one of the important milestones in medical history."

McGill

Dr. G. LYMAN DUFF, pathologist and dean of the faculty, died on November 1, at the National Neurological Institute after a long illness. Dr. Duff was one of the three Canadians ever to be named president of the American Association of Pathologists and Bacteriologists. He has been a faculty member since 1939 and dean since 1950.

Mayo Foundation (Minn.)

Appointed to full professorships by the Board of Regents are: Dr. B. M. BLACK, surgery; Dr. E. N. COOK, urology; Dr. W. S. FOWLER, physiology; Dr. H. M. KEITH, pediatrics, and Dr. E. E. WOLLAEGER, medicine. Appointed to associate professorships were: Dr. A. FAULCONER, anesthesiology; Dr. G. A. HALLENBECK, surgery, Dr. A. G. KARLSON, comparative pathology; Dr. P. R. LIPSCOMB, orthopedic surgery; Dr. G. M. MARTIN, physical medicine and rehabilitation; Dr. D. R. NICHOLS and Dr. L. A. SMITH, medicine; Dr. C. A. OWEN, clinical pathology, and Dr. D. G. PUGH, radiology.

Med. Coll. of Virginia

Dr. WILLIAM F. MALONEY, assistant dean, has been appointed dean effective January 1, 1957. Inauguration exercises for the installation of Dr. ROBERT BLACKWELL SMITH Jr., as fourth president of the college are scheduled for December 17.

With the completion this fall of the new School of Nursing building (left), the Georgetown University Medical Center now consists of three major units. At center is the university hospital, and at right is the combined medical and dental schools building. The $1,600,000 nursing school structure has living quarters and classroom accommodations for 200 women students. Ground will be broken shortly for a new outpatient and laboratory wing at the south (top) end of the hospital. (Photo from Georgetown University News Service.)

Missouri

Dr. ARNOLD A. WHITE has been appointed assistant professor in the department of biochemistry and will join the staff on January 1, 1957.

Dedication ceremonies for the new medical center were held on November 10. The board of curators, the president and faculty assisted in the program.

NYU-Bellevue

A number of dermatologic research and teaching fellowships have been made available at the New York Skin and Cancer Unit. These fellowships are available on two levels. One is for dermatologists who have completed their three-year full time training in dermatology and are interested in a research or teaching career in special fields of dermatology. A stipend of $7,000 a year is paid. The second type of fellowship at $5,000 annually, is available to graduate students or residents who have completed their basic science year at a recognized institution and who plan to do research or to assist in teaching in special fields. Applicants should apply to: The Director, Service of Dermatology; New York Skin and Cancer Unit, 330 Second Ave., New York 3, N. Y.

In recognition of the late Dr. JOSEPH GOLDBERGER's contributions to the medical sciences, a laboratory has been named in his honor and dedicated to the investigation of nutritional and metabolic diseases.

Dr. LOUIS L. BERGMANN and Dr. JOSEPH PICK have been promoted to full professors in the department of anatomy. Dr. JOHANNUS BARTELS has been appointed associate professor of anesthesiology in the postgraduate school.

Northwestern

Dr. JOHN GRAYHACK has been named director of a new laboratory for research in urology. The laboratory has been made possible by the Lucy and Edwin Kretschmer Fund. The fund was created in honor of his wife and

son by Dr. Herman L. Kretschmer, former president of the American Medical Association and Northwestern alumnus before his death in 1951.

Stritch (Loyola)

Dr. THOMAS P. GALARNEAULT has been appointed assistant dean effective immediately. Dr. ALEXANDER G. KARCZMAR has been appointed professor of pharmacology and therapeutics.

Temple

The new medical center was formally dedicated on November 30. The three new buildings represent a $12,000,000 development program which raises capacity to 1,000 beds and annual admissions to a probable 30,000. Out-patient visits are expected to reach 400,000 annually, involving service to some 80,000 patients.

Vanderbilt

Dr. ROBERT D. COLLINS, assistant professor of pathology, currently on active duty at the Army Research Laboratory, Fort Knox, Ky., has been awarded a Senior Research Fellowship by the Public Health Service, as has Dr. VIRGIL LEQUIRE, assistant professor of anatomy.

Washington U.

Dr. EDWARD W. DEMPSEY, professor and chairman of the department of anatomy, has been named assistant to the dean. The appointment is effective immediately. In his new post Dr. Dempsey will share administrative duties. He will retain his position in the department of anatomy.

Harvard

Dr. JOSEPH WARREN GARDELLA, research associate in medicine, has been named assistant dean for student affairs in the faculty of medicine. Dr. Gardella will be responsible for academic and non-academic aspects of student activities. He succeeds Dr. WILLIAM KETCHUM who has returned to private practice.

Woman's Medical

The Public Health Service has renewed the following grants: $25,000 for cancer research for one year; $25,000 for cardiovascular teaching for one year; and $25,000 in mental hygiene for one year, increased from $15,000. The Kellogg Foundation has extended a two year grant for $20,000 to the department of preventive medicine.

Yale

The Public Health Service has provided a grant of $425,199 to support investigations into the causes of cerebral palsy and mental retardation. Dr. GILBERT H. GLASER, associate professor of neurology will be in charge of the project which will extend over the next four years. The program will provide evaluation of the hereditary and environmental factors which may be responsible for such disorders as well as blindness and deafness.

Publications

Useful information for both medical educators and students is published by the Association of American Medical Colleges. These publications may be obtained either free of charge or at cost from the Association headquarters office, 185 N. Wabash Ave., Chicago 1, Ill.

Booklets

Medical Education Today ($1.50).
Report of the Conference on Preventive Medicine in Medical Schools (clothbound, $1.50).
Admission Requirements of American Medical Colleges—1956 ($2.00).
Fellowships, Funds and Prizes Available for Graduate Medical Work in the United States and Canada—4th Edition published 1954. ($1.50).
By-Laws of the Association of American Medical Colleges (Revised 1955).
Minutes of Proceedings of the Annual Meetings (1947-1955 Minutes now available).
Public Understanding and Support of Medical Education.

Journal of Medical Education

Journal Supplements available:
The National Health Service of Great Britain ($1.00).
Medical Education in Time of National Emergency ($1.00).
The Critical Cataloging of Medical Films ($1.00).
The Teaching of Physiology, Biochemistry and Pharmacology (Report of the 1953 Teaching Institute)—$2.00, paperbound; $3.00, clothbound.
The Teaching of Pathology, Microbiology, Immunology, and Genetics (Report of the 1954 Teaching Institute)—$2.00, paperbound; $3.00 clothbound.

Medical Audio-Visual Institute Publications

Film Catalog, Fall 1955
Reprints from the Audiovisual News Section of the Journal of MEDICAL EDUCATION.
Films in Psychiatry, Psychology and Mental Health (available from the Health Education Council, 10 Downing St., New York 14, $6.00).
Films in the Cardiovascular Diseases (Part I available from the American Heart Association, 44 E. 23rd St., New York 10, $2.00. Part II available from the Medical A-V Institute, $2.00).
Review of Films in Atomic Medicine.
The Short Motion Picture for Medical Classroom Instruction.
Films published by the MAVI are included in the Film Catalog.

Publications of Related Organizations

Suggestions for Supplementing the Medical Curriculum in Time of National Emergency (Joint Committee on Medical Education).
Hospitals Participating in the Matching Program 1956 (NIMP publication).
Results of the Matching Program 1956 (NIMP publication).
The Student and the Matching Program 1956 (NIMP publication).
Medical College Admission Test—Bulletin of Information 1956 (Educational Testing Service publication).

Audiovisual News

THE DEPARTMENT OF AUDIOVISUAL EDUCATION at the Kansas University Medical Center

DAVID S. RUHE, WILLIAM M. McGREW, MICHAEL R. KLEIN

(Second part of a two-part article)

Photography: Communicating with the Camera

IT IS EASY to take photo services for granted, to heap endless labors upon a photographic group. Almost all faculty members are "developing a slide collection". Some few departments are seeking pictures of everything in their special area of teaching. Administration asks for indentification and public relations material. Investigators wish to report visual results. The library is happy to turn over certain duplicational services. The Cardiovascular Laboratory photostats some 20,000 ECG's each year. The motion picture fever easily infects a faculty. And latterly, TV demands confound the smoothest of photo services with absolute deadlines.

Slides: The Staff of Medical AV Life.

The standard 2 x 2 kodachrome slide is the volume product of our personalized service to teachers. The 2 x 2 has become "standard," although none of the older professors who organize annual medical meetings seem to know it yet. The 2 x 2's are cheaper, less fragile, light in weight; and newer projectors permit brilliant projection at any distance; blower noise is a problem. Direct positives are the usual delivery method for B&W slides. Individual collections of slides are fostered, as long as they mean better teaching for the center.

Motion Pictures: Tough and Troublesome.

Practically speaking, the making of respectable medical motion pictures is invariably a tough and thorny process. Simple record films, short report films, serious productional opuses, all create problems related to the plain obstinacy of the film medium.

As long as motion pictures, like slides, are owned and used by their makers only, great technical failings are tolerated. But when prints are made and loaned out, any skeleton of poor motion picture technology is spotted in the closet and barked at mercilessly.

The sheer costs of adequate equipment, of film, of processing, of sound and animation produce recurrent economic roadblocks. Even with the greatest skill and ingenuity, there are usually exorbitant costs in time spent, despite some inherent economic advantages of university production. The special skills of motion picture microscopy, fluoroscopy, and en-

Dr. Ruhe is head of the department of audiovisual education, Mr. McGrew is head of the Photography Section and Dr. Klein is head TV Section and Chief, Biophysics Laboratory.

Photographic Workshop. Photographers William McGrew, Barton LaVine, Burton Johnson.

doscopy must wait for money and equipment, slowly acquired skills, and time. Sooner or later all are requested and should be supplied. Technically speaking, we are a long way from the ideal of easy and inexpensive motion picture methods that all may readily use.

Film Production. It is worth producing very many films for faculty members. Every sericus teacher *should* be making and using film, assembling his own "teaching collection" to join his slides. If the phenomenon or method is in motion, it usually belongs on film. A reflex motion picture camera is a great help; a range of lenses helps, especially those permitting ever bigger closeups, for an abundance of BCU's and ECU's characterize most of the best medical films. Short films of cases are rapidly becoming routine, as our 13.5 thousand film feet show. But how to supply adequate titles, good simple animation, and good sound without permitting motion picture work to swallow all departmental time and money is an unanswered question, as yet.

Film production has been extensively employed in our eight lay TV programs; it is another drain upon our human resources.

GRAPHICS: Art in Medicine

The task of pouring out drawings of many kinds, interminable charts, posters, cartoons, designs, layouts, lettering, retouchings and mountings is heavy and exacting. The commercial skills of drafting, layout, lettering etc. are at a considerable premium. A part-time aide for charts and graphs can handle plotting and rendering of the great number of scientific graphs, per the experience of the University of Illinois.

Exhibits: 3D Presentation With a Vengeance.

The fabrication of exhibits can well become the major creative endeavor of a department. Our 15-18 exhibits per year pose two recurrent questions: (1) Can we justify the time and expense of construction unless we use exhibits 3 or more times; and (2) What can we do to keep the exhibits functional *after* their brief weeks at medical meetings? Our working policy, in light of the geographical

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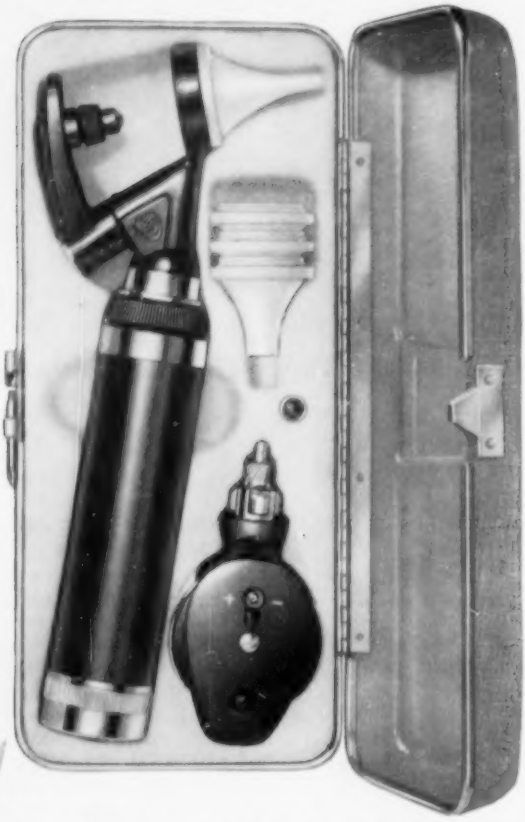

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area of Medical Center interests, is to seek to use each exhibit, with or without modification, in the K. C. Southwest Clinical Society in October, Kansas and Missouri State Medical Societies in May and March, and again at some national specialty meeting providing content warrants. We have yet to create continuing effective use of our exhibits in halls, laboratories, classrooms, etc.

Graphics in Films and TV.

Medical artists must work with the photographic staff in titles and animation. Even the simplest of diagrammatic and registered inserts in films pose an order of skill which trained illustrators must learn. But even the simplest animation usually far exceeds the time-skill quota which we, and most busy departments, dare allot. Moreover, the required animation camera stand is beyond the economic reach of workaday departments.

For TV programs and moving picture efforts the complex disciplines of illustration with motion must be a late departmental development, and cannot be allowed to encroach upon regular and less exacting services rendered.

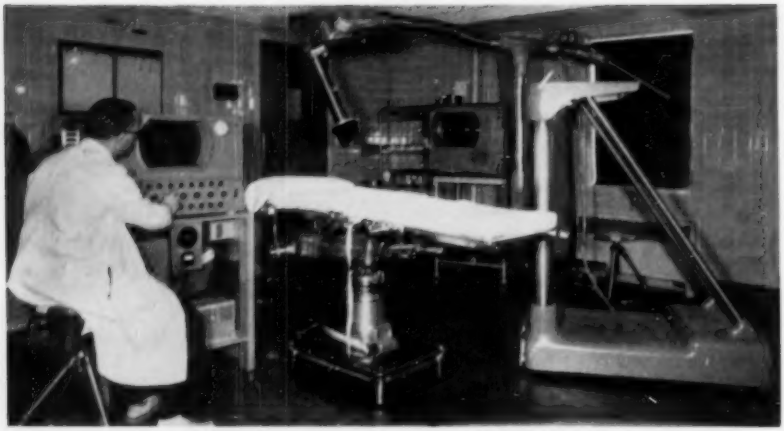
TELEVISION: New Torment of the AV Department

Almost everyone has been bitten by the TV bug. How can this be avoided, when the cyclops is in every living room? But medical center TV probably is going to prove to be a rather unique beast, full of rich and rewarding surprises. TV activities will likely come to be one function of AV departments, if they develop properly. But necessarily there will always be dichotomous effort with the medical electronics and biophysics personnel.*

Our TV efforts are published elsewhere, 6, 7, 8 (Nov. *J. Med. Educ.*). Suffice it to say that intramural and

*Dr. Klein is both head of the TV Section, and chief of the Biophysics Lab.

Illustration department. Secretary Oma Haas; illustrators Kay Bell Wahl and Jo Ann Clifford.



Color tv camera chain-in are Dolly Boom, camera with 20 inch lens, color receiver and control monitor, with physicist-engineer, Michael R. Klein.

extramural professional and lay teaching are our three workaday concerns. Medical research utilizing the TV eye should be very rewarding when the TV instrument is improved.

Intramural TV: Super-immediacy.

On-the-spot TV is our method of choice to make the television camera an instrument of the individual teacher, and to add TV's immediacy to medicine's reality. When TV microscopy, endoscopy and fluoroscopy have been reasonably explored . . . . . and we are among those beginning to blaze these trails . . . . . the television camera chain may well then be considered as absolutely indispensable to effective medical teaching as is the microscope. Endoscopy by TV has a particularly exciting prospect. The large screen color projector may well become a permanent fixture of all large classrooms.

Extramural TV: Scrambled Images.

Reaching doctors in their offices for postgraduate refresher teaching presents a remarkable opportunity for television. Scrambled image general telecasts [1, 2] will be one selective method for certain types of material. With its very heavy postgraduate effort, Kansas will aid in such pioneering when it becomes technically practicable.

Research: New Worlds Coming

The availability of the vidicon camera with X-ray image intensifier, the coming of the TV-X tube and of the ultra-sensitive "star-gazer" image orthicon tube . . . . . all of these will provide an instrumental battery which should give radiology an enormous new impetus toward better X-ray visualization.

In very many areas of research TV observation has speculative uses. It remains to make the TV camera available to investigators.

Lay TV: Everyone in the Act.

Health programs are the responsibility of every university medical center. Indeed medicine is so interesting that no medical center can avoid involvement with local ETV or commercial stations. Our first eight half-hour programs of the 1956 Kansas University *Highroads to Health* series provided excellent pub-

lic relations, plus experience. Kinescope recordings of TV programs appear to us to be the only justification for the time spent in such exciting but wearying and otherwise evanescent production.

COSTS

Our department receives basic support from the administration, but gains partial support through certain services-for-pay. Production grants for specific films and television programs fortify the budget. Grants for specialized equipment have augmented the television budget. Research grants for exploration of TV's potentialities add to the total. A single AV fellowship grant* permits one form of graduate training.

SUMMARY

A department of audiovisual education fuses activities of photography, illustration, television and general services in one fabric of hard-working assistance to the personnel in a medical center. A high creative potential exists, which requires continuing intensive exploration over many years.

*The Pfizer Fellowship in Medical Audiovisual Education.

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1. WARREN, F. Z.: Medical Television: An Evaluation. *J. Med. Educ.* 31:6, 413-9, June 1956.
2. WARREN, F. Z.: TV in Medical Education. Handbook. American Medical Association, February 1955.

Book Reviews

Midwifery

R. Christy Brown, M.D., **Barton Gilbert,** M.D., **Donald Fraser,** M.D. and **Richard Dobbs,** M.D. The **Williams and Wilkins Company,** Baltimore, Md., 1956. 892 pp with index.

The fourth edition of this handbook sized British text is designed primarily as a general treatise for the instruction of midwives. It therefore differs considerably from the customary American text in both scope and presentation.

The scope is truly comprehensive; included as introduction are elementary presentations of physics, chemistry, anatomy, physiology, biochemistry, and endocrinology. Two hundred pages have passed before conception takes place! In presenting this material for readers of limited scientific background, the language is kept simple, nontechnical, and very concise. As is usual in British texts considerable explanation is by means of apt analogy.

The presentations of normal and abnormal obstetrics and of basic newborn pediatrics are similarly level-headed and concise. The dividing line between that which a midwife may herself do and that for which she must summon medical aid is well delineated. The authors' opinions appear to be little at variance with customary American teaching, though occasionally the reader is mildly surprised. For example, "all breeches should be converted into vertex presentations by external versions," or "meat should be taken sparingly (during pregnancy)," sound a bit unusual to the American ear. The theory that women who feel perfectly well during early pregnancy have a low progesterone level and are more likely to abort than those with morning sickness was new to the reviewer. There are a very few out and out misstatements — "forty per cent of hydatidiform moles are followed by the development of chorionepithiolma."

One unfortunate result of the tremendous scope is that the book is somewhat chopped up. There are 14 sections and 87 chapters, some of which are necessarily quite brief. The illustrations (drawings and photographs) would rank as not better than fair. Pelvic and fetal measurements in inches and the numbering of fetal positions are examples of mild problems in terminology for the American reader. Discussions of chemotherapeutics have been rather obviously appended to the earlier edition and hence are not well integrated.

Far outweighing these minor weaknesses is the fact that the book is uniformly clear and beautifully written. Explanations of mechanisms and physiology are in many cases superior to those of American texts for the medical student. Though "Midwifery" well repays reading by the educator, it is quite unlikely that the book will find any appreciable number of readers in this country. It is too detailed for a nursing text, too long for a synopsis, and a bit elementary for medical school use. Unfortunately, the fact that we don't train midwives will deny this text the audience it merits.

William Kiekhofer, *Wisconsin*

New Bases of Electrocardiography

Demetrio Sodi-Pallares, M.D., and **Roynll M. Calder,** M.D. The **C. V. Mosby Company,** St. Louis, 1956. 727 pp with index, $18.50.

There has been no previous English publication of this book which has had three very popular editions in Spanish. It is not, however, only a translation but a revised work containing new material and view points.

This is not just a review of clinical electrocardiography, but is a book giving the concepts of electrophysiology upon which the new method of clinical interpretation is based marking the change from the empiric to analytic method This is the "new basis" mentioned in the title.

By the authors' statement, it is a summary of the research that has been done at the Mexican Institute of Cardiology. It is this, but in addition, it is also a well organized review of the fundamental material on the subject of cardiac electrical phenomena from the beginning through Einthoven, Lewis, and Wilson to the present, thus fulfilling the need of placing under a single cover in an orderly fashion most of the vast number of contributions which in the past could only be found by a detailed study of many publications from many lands. This fact is evidenced by the 960 item reference table and the appendix of reorganized mathematical studies and formulae.

The organization of the subject matter follows the general pattern of first studying the principles of electricity, of the electrophysiology of the heart, of the conducting medium, and of the methods of recording these phenomena. These variants are then applied to the normal heart and to its abnormal variants, both anatomic, such as ventricular hypertrophy and infarction and to the physiologic variants, such as bundle branch block and injured muscle.

W. Donald Close, *Indiana*

Microbiology and Pathology

Charles F. Carter, M.D. and **Alice Lorraine Smith,** Ph.D. **C. V. Mosby Co.,** St. Louis, Mo., 1956. 970 pp with index.

The present volume of Carter's and Smith's textbook of microbiology and pathology for nurses is a competent summary of those subjects adapted to nursing students. The general pattern of the text is very practical and reflects the authors' experience in clinical microbiology and pathology. The first part of the book is essentially an elementary textbook of medical microbiology to which are added short sections on parasitology and mycology. The chapters on the role of the clinical laboratory in a general hospital, collection of specimens and immunization procedures are particularly useful. The second part is a greatly abbreviated textbook of pathology which suffers considerably from the necessity for presentation of the material in such a condensed manner.

One might wish that in a text which includes both microbiology and pathology that a more dynamic and complete consideration of the pathogenesis of infectious disease were possible. The increasing prominence of viral infections hardly receives the attention deserved in a single chapter of 33 pages. The text accomplishes its purpose well, however. A tremendous amount of material is presented accurately and the text will fill a real need.

A. F. Rasmussen Jr., *UCLA*

Electrocardiographic Test Book

Edited by **Travis Winsor,** M.D. Published by the **American Heart Association,** Inc., New York, New York. 263 pp with index.

As stated in the foreword, this book is not intended to be a text, an atlas, nor a comprehensive treatise on electrocardiography, but a tool to be used in teaching and testing electrocardiographic interpretations. Volume 1 contains (a) 119 electrocardiograms, with one or two questions about each, (b) over 200 questions on interpretations, (c) tables listing values of measurement for various intervals and deflections found in groups of presumably normal individuals. An index follows. Volume 2 consists of answers, with explanation, of the questions.

The tracings and questions are on the whole, well selected, and are well reproduced. The arrangement of the material is excellent. The foreword and preface properly point out several precautions to be observed (i.e. small numbers of subjects utilized in certain of the tables of normal values, the lack of unanimity of opinion in the broad field of electrocardiography).

A brief trial of this book was performed with undergraduates, house staff, and practicing internists. It is to be definitely recommended as a useful tool, an adjunct which will facilitate the teaching of electrocardiographic interpretation. It will probably find its greatest field of usefulness in providing internists with stimulating material with which to test their knowledge of electrocardiography.

James Taylor, *Arkansas*

On The Early Development of Mind

By **Edward Glover**, M.D. **International Universities Press**, Inc., New York, 1956, 483 pp.

Dr. Glover of London is a recognized authority of international repute on all matters concerning the theory and practice of psychoanalysis. He is known as a brilliant teacher whose well organized and succinct textbooks on psychoanalytic technique and concepts have systematically elucidated these complex subjects to students and practicing analysts of this generation.

The book reviewed is a first volume of 28 selected papers covering a period of 32 years. Its content fully measures up to the high expectations based on Glover's previous writings. Many of the papers included are standard psychoanalytic references. The papers are in chronological order rather than being organized by subject matter. They deal with a variety of areas, including technique, clinical syndromes, libido theory, character formation, the effects, etc., all in the frame of reference of the early development of mind. Also included in book form for the first time are original, now classic papers on Glover's "nuclear theory of ego formation."

The author's brief explanatory introductions to many of the papers give them conceptual continuity as well as providing a general historical background. Although consisting of papers dealing with many areas, the book is by no means disjointed. The bibliography of Glover's writings is helpful to the student of psychoanalysis.

This reviewer feels that the present work is invaluable and indispensable to psychoanalysts and serious students of psychoanalysis. A prerequisite for the prospective reader is a basic understanding of psychoanalytic theory and concepts. Its subject matter is complex and far above the level of the medical student and any but the most sophisticated and widely read psychiatric resident.

Leon Bernstein, M.D., *Illinois*

Books and Pamphlets Received

(As space permits, those with the greatest interest to our readers will be reviewed)

Examination of the Nervous System

A. Theodore Steegmann, M.D., The Year Book Publishers, Inc., Chicago, 1956, 164 pp. with index.

Pre and Postoperative Care in Pediatrics

William B. Kiesewetter, M.D., The Year Book Publishers, Inc., Chicago, 1956, 347 pp. with index.

Handbook of Pediatric Medical Emergencies

Adolph G. DeSanctis, M.D. and **Charles Vargo, M.D., The C. V. Mosby Co.**, St. Louis, 1956, 389 pp. with index.

Functions of Autonomic Transmitters

J. Harold Burn, M.D., The Williams & Wilkins Co., Baltimore, 1956, 288 pp. with index.

Personality, Stress and Tuberculosis

Edited by **Phineas J. Sparer, M.D., International Universities Press Inc.**, New York, 629 pp. with index.

Gathercoal and Wirth, Pharmacognosy

Edward P. Claus, Ph.D., Lea & Febiger, Philadelphia, 1956, 751 pp. with index.

Fractures, Dislocations and Sprains

John Albert Key, MD. and **H. Earle Conwell, M.D., C. V. Mosby & Co.**, St. Louis, 1956, 1168 pp. with index.

Practical Pediatric Dermatology

Morris Leider, M.D., C. V. Mosby Company, St. Louis, 1956, 423 pp. with index.

The Personnel Exchange

Faculty Vacancies

• MEDICAL MICROBIOLOGIST: Full-time faculty position in eastern medical school department of bacteriology. Teaching of medical and graduate students. Time for research. Rank and salary depend on experience and training. Address: V-50.

• PROFESSOR OF ANATOMY: The chair of anatomy will be vacant September, 1957. Salary range, $7,000 to $9,500, depending upon qualifications and experience. Address: Dean of medicine, Queen's University, Kingston, Ontario.

• NEUROSURGEON: Lecturer in neurosurgery and consultant for hospital. Appointment must be taken up within the next year but further training might be required before assuming full responsibility. Send full curriculum vitae and three copies each of six testimonials. Address: Professor of surgery, Queen's University, Kingston, Ontario.

• PSYCHIATRIST: Professor and departmental chairman to be selected in the near future. Opportunity to develop a department in a new university hospital. Address inquiries to: Dean J. S. Hirschboeck, Marquette University School of Medicine, Milwaukee 3, Wisconsin.

• SURGEON: Professor and departmental chairman. Opportunity to develop a department in a new university hospital. Address inquiries to: Dean J. S. Hirschboeck, Marquette University School of Medicine, Milwaukee 3, Wisconsin.

• DIRECTOR OF EDUCATION AND RESEARCH: Position available immediately to coordinate and direct teaching and research program for residents, internes and clinical clerks on a full time basis. Opportunities for personal research. M.D. or Ph.D. Private clinic with affiliated hospital and medical school affiliation. Apply to administrator, Guthrie Clinic, Sayre, Pa.

• BIOSTATISTICIAN: A vacancy exists in the newly organized division of biostatistics, department of public health, faculty of medicine, University of British Columbia, Vancouver 8, B.C., Canada. Applicants must have a basic degree in arts or science and should have had considerable training and experience in statistics. Preference will be given to those with a postgraduate qualification in biostatistics. The appointee will be required to organize a program of research and teaching. Salary according to qualifications and experience. Address: Dr. James M. Mather, Professor of Public Health, at the above address.

• PEDIATRIC STAFF OPENINGS: Two positions are available. One having to do specifically with the care of the premature and newborn and consultant in crippled children's services; another involves the position of associate medical director in charge of hospital, as well as general teaching. Both positions involve heavy teaching and administrative duties. Some time for limited research. Address: Dr. Henry B. Strenge, Department of pediatrics, The University of Oklahoma, School of Medicine, 800 Northeast Thirteenth Street, Oklahoma City 4, Oklahoma.

• TRAINEESHIP IN RHEUMATOLOGY: Available immediately in university center. Participate in clinical investigation, diagnostic and therapeutic program. Address: V-51.

• NEUROSURGEON: Lecturer in neurosurgery and consultant for hospital. Appointment must be taken up within the next years but further training might be required before assuming full responsibility. Send full curriculum vitae and three copies each of six testimonials. Address: Professor of surgery, Queen's University, Kingston, Ontario.

• PROFESSOR OF ANATOMY: The chair of anatomy will be vacant September, 1957. Salary range, $7,000 to $9,500, depending on qualifications and epxerience. Address: Dean of medicine, Queen's University, Kingston, Ontario.

• CLINICAL AND RESEARCH AUDIOLOGIST: For new hearing center. Address: Dr. Fred Harbert, Jefferson Medical College and Hospital, Philadelphia, Pa.

• BIOCHEMIST: Instructor or assistant professor of biochemistry in a medical school. Ph.D. essential, some experience desirable. Opportunity for research. Salary $5750-$6500, depending upon qualifications. Address: Dr. Paul L. Day, School of Medicine, University of Arkansas, Little Rock, Ark.

• PSYCHIATRISTS: Several positions open in a young and burgeoning department. Medical liaison, inpatient service, outpatient department, student health. Salary and faculty rank commensurate with qualifications. Address: V-52.

To aid in solution of the problem of faculty vacancies, MEDICAL EDUCATION will list persons and positions available, as a free service. The school department or person may have the option of being identified in these columns or of being assigned a key number for each position listed. Mail addressed to key numbers will be forwarded to the person or department listing the request.

Information for these columns should reach the Personnel Exchange, Journal of Medical Education, 185 N. Wabash Ave., Chicago 1, Ill., not later than the 10th of the month which precedes the month in which the listings will appear.

Personnel Available

• MEDICAL JOURNALIST: Woman writer and photographer. Medical social work education. Experienced in magazine layout and production. Seeks publicity or magazine position in midwest or western area. Address: A-247.

• PUBLIC RELATIONS DIRECTOR: Top medical center experience. Seeks growth opportunity in medical administration. Address: A-241.

• OPHTHAMOLOGIST: 32. Three years approved residency in ophthalmology from a large teaching general hospital. Desires teaching or research fellowship in ophthalmology at a medical-hospital institution or preceptorship under ophthalmoligist. Address: A-242.

• BIOCHEMIST: Ph.D., Columbia University, 1940. Good background in teaching and research. Associate professor of biochemistry; numerous publications on chemistry and metabolism of steroid hormones. Presently completing two year visit in English medical college. Available USA, fall, 1956. Address: A-243.

• PHYSIOLOGIST-PHARMACOLOGIST: Ph.D. Research experience. Publications. Desires opportunity to affiliate with laboratory doing research in endocrinology, reproduction or pharmacology. Interested in institution for which senior post-doctoral fellowship can be granted by National Science Foundation. Metropolitan N. Y. area only. Address: A-246.

• MICROBIOLOGIST: Ph.D., 34, male, married. Background in host-parasite relationship in infections disease, radiation, microbiology. Three years research and part-time teaching experience. Desires position in teaching and research. Would consider medical school appointment with opportunity to complete requirements for M.D. degree. Address: A-248.

• PHARMACOLOGIST: 28. Will complete Ph.D. work by October 1956. Have completed 2½ years medical school and passed first half state and national board examinations. Experience in teaching in pharmacology laboratory. Research in endocrinology. Desires part time teaching or research position in a medical school with opportunity to complete work for M.D. degree. Address: A-250.

• PEDIATRICS INSTRUCTOR: 64. Graduated from Russian medical school, have 32 years teaching experience in Russian and Austrian medical schools, hospitals as associate professor, later head of medical staff. Address: A-252.

• THORACIC SURGEON: British subject, F.R.C.S. 34. Postgraduate work includes 3 years in U.S. Familiar with cardiac catheterisation and cardio-pulmonary functional investigations. Experience has included basic research and lectureship in surgical anatomy. Address: A-256.

• INTERNIST-CARDIOLOGIST: 37. Seeks change of location. Presently director of cardiopulmonary laboratory of large university hospital. Have active research program. Also direct cardiac clinic and teaching program. F.A.C.P. Certified in sub-specialty. Interested in teaching, administration, research. Address: A-251.

• PHYSIOLOGIST-CYTOLOGIST: Ph.D., male, 30, married. Background in mammalian physiology, zoology and anatomy. Desires opportunity for research with or without teaching, in the East. Interest and experience in invertebrate-vertebrate material, problems in nuclear and cytoplasmic inter-relationships, cytochemical studies on nuclear changes during tumor formation using cytospectrophotometry, electron microscopy. Some teaching experience in mammalian physiology. Address: A-249.

• MEDICAL BACTERIOLOGIST: Ph. D. Excellent background. Fifteen years responsible research, teaching, diagnostic bacteriology and administrative experience in colleges, universities and hospitals; 10 years TB research; 7 years director of research. Desires teaching and/or research, preferably in medical school, or position as bacteriologist in charge, chief or director of research in some area of medical bacteriology, preferably TB. Address: A-253.

• ANATOMIST: 36, M.D. (Vienna) Austrian. Publications, societies. Five years teaching experience in approved North American medical school. At present associate professor. Seek 2-3 years teaching experience in U.S. medical center. Address: A-257.

• MEDICAL WRITER: Male, veteran, married. B.J. degree in medical journalism; A.B. degree in zoology. Address: Box 491, Columbia, Mo., for portfolio.

• MICROBIOLOGIST-PARASITIOLOGIST: Ph.D., 29. Four years teaching experience in small college; four years productive research in the nutrition, biochemistry, immunology and chemotherapy of parasitic infections. Extensive graduate training in pharmacology. Member of Sigma Xi and many other professional societies; numerous scientific publications. Married, veteran. Desires academic appointment with good facilities for research. Address: A-258.

• CLINICAL RESEARCH: M.D. presently engaged in experimental and clinical research into hemodynamic problems of hypertension. Located now in England, English training. Interested in extending experience by working in a research unit in the U.S. Address: A-254.

• PHYSIOLOGIST: Ph.D. Biochemically oriented. Experienced in the application of microchemical methods. Extensive research experience. Presently studying biochemistry of the eye. Desires academic position with teaching and research responsibilities. Address: A-259.

• PHYSIOLOGIST: M.B.B.S., M.Sc. (med.), 32, Indian. Hold teaching and research position (8 years) as lecturer in physiology. Possess special training in nutrition researches. Publications. Desire postgraduate studies in physiology leading to Ph. D. Prepared to work on stipend or fellowship in any capacity. Address: A-255.

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Medical college teachers and administrators, and other persons interested in medical education now have the opportunity to become Individual Members of the Association of American Medical Colleges.

Individual Membership means receiving the Journal of Medical Education each month. It means participating in the discussions of the Annual Meeting and receiving the reports of the Teaching Institutes. It means receiving copies of the yearly *Directory*, the *Proceedings* of the Annual Meeting, and other Association publications. And it makes available a valuable, though limited, information service and a personnel exchange service.

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To obtain membership, fill out the application form below, append check for $10, and return to the Association's central office at 185 N. Wabash Ave., Chicago 1, Ill.

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